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## BRIEFLY TOLD.

THE OUTING TRIPS, AMERICAN GAS INSTITUTE.—It is quite a while now, as things go in this land of the busy, since the outing trips of the American Gas Institute, as fitting finals to its technical sessions, were enjoyed; but it would indeed be unjust to those who so carefully planned them were not some fair mention made of the "scope and plan" as to the carrying out thereof. Right after the close of the business meeting proper, which was a fact shortly after noon of Friday, the 23d ult., and in the face of a decidedly glum sky accompaniment, accentuated by a gusty breeze that carried with it a mild solution of the order drizzly, the members of the sterner sex "wended their way" to the foot of East 42d street, to the string piece of the bulkhead of which was tied the good Sound steamer "Sagamore." While it was generally held that the invitation of the Consolidated Gas Company to visit and inspect its magnificent new plant in course of construction on Casino Beach, Astoria, L. I., would be quite generally accepted, it was not thought that the Sagamore would be on the small side of transporting the party in ease and comfort, the real fact is that the space aboard was not from any point of view massive, for the voyagers were many above the estimate. Still in this very way the members were naturally brought "closer together." This was particularly shown when, anchors having been lifted and the Sagamore slanted to her course. Their lodging place having been properly sighted by Commodore Geo. D. Roper, that gentleman commenced to assist in the unloading of the solid part of the luncheon provided—the liquid section of the entertainment was easily gotten at, as also were the cigars. Hardaport of the gangway stood the Commodore and the way he passed-up the sandwiches was so seamanlike that many of the "marines at attention" were heard to remark, that if he visited Decatur, Ills., once in a while, he *might* have an opportunity to show his skill over getting in exchange for his stack of whites—the sandwiches Mr. Roper so deftly distributed were made with white bread—pyramids of red and blues. Be that as it may the "Sagamore" ploughed the heaving waters of the East river, until Casino Beach was safely reached. On reaching the yards the visitors speedily ranged themselves under the standards lettered conformably to their trip tickets, and in groups of 25 aligned in procession, and even though the sky was dull to leadeness, all looked their best when the photographer passed the word ere he pressed the button. The picturing at an end the groups went on, to and through and about the various sections of the mammoth plant. It is not proposed here to go into details at all in describing that which the interested examiners saw, but words of wonderment frequently heard indicated that the vastness as well as the completeness of the plant was duly impressed upon them. The items, however, that attracted the greatest attention were the completed, huge 15-million holder, the completed and yawning tank alongside awaiting for a twin storage vessel, the great purifying room, the magnificent meter house and the machinery for the handling of the by-products. Naturally it would have taken vastly more time than was at hand to describe at all at length the dimensions, purpose and operation, and the like, of the huge houses, covering many acres, and the apparatus; but this teaching was quite lucidly done through a profuse and complete system of placarding, announcing in figures and words the necessary facts. The one thing, however, that attracted the attention and comment of every visitor was the handsome bronze tablet, recording the time of commencing and concluding the work of the construction of Plants A and B, together making the first completed unit of the final Astoria works. The tablet was unveiled Friday, August 25th, which day was chosen in that it corresponded to the date marking the


LIBRARY OF CONGRESS. NOV 2 1908 SMITHSONIAN DEPOSIT.

next anniversary of the birth of the Company's well-loved Chief Engineer, Mr. W. H. Bradley. Under his guiding chieftainship, aided by his faithful subalterns, all this transforming and uplifting had been done—and the writer well knows from his early days that the Woolsey's Point marshes would stand much transforming to be fitted for the builder's work. The inspection completed, the inspectors again embarked on the "Sagamore," and in the midst of the fragrant odors of their host's havanas, accompanied by the buzzing of animated conversation over the magnitude and completeness of the Astoria plant, as existent and planned, the return journey was pleasantly made, and the hotel headquarters made at 5 P.M., an hour that tells all as to the completeness of the arrangements made by the hosts—the Consolidated Gas Company. In this particular connection no measure of credit would be too large to extend to Mr. Walter R. Addicks, who assumed personal charge of the planning of the entire visit.

The closing number of the outing time was fixed for Saturday, the 24th. At the appointed hour (9 A.M.) the "Sagamore" steamed away for the trip up the Hudson to West Point. The voyagers numbered well over 400, and of them at least 150 members of the gentler sex were of the party. The atmospheric conditions were not especially inviting, but an excellent orchestra helped many to forget that the sun was clouded. The *entente cordiale*, however, was perfect, and the visiting back and forth, aided and abetted by a luncheon served about noon, caused the travellers to take on the appearance and ways of a huge "family party"—for such it really was. Be it bright or dull, in sunshine or in rain, the glory of the Hudson river is ever present. The run to West Point, whose sheltering arms surround the persons of the future ranking soldiers of the nation, was at an end at 1 P.M. Unfortunately a short rainfall, but sufficient to put the Cadets in quarters, prevented the reception drill so kindly arranged by the Commandant, Colonel Scott. This, however, gave the visitors all the more time in which to go through the various buildings maintained by Uncle Sam for his scholar soldiers and their tutors. There is scant, in fact, no reason why comment should be made here upon the quarters and their appearance. Enough it is to say, they were in scope and keeping with an establishment fitted to equip the warrior students of our country. At 2:30 P.M. those who did not propose to witness the football contest between the Army and Colgate University, boarded the "Sagamore" on the return trip to New York, arriving there shortly after 6. By far the larger number remained to see the kicking contest, which was hotly fought, with an eventual score of 6 to 0 in favor of the Army. The latter half of the contest was played through quite a downpour of rain. The contest ended, the party boarded a special train, which speedily whirled them to the city, in ample time for dinner, and the outings were at an end. The third annual meeting of the American Gas Institute will long be remembered by those who had part in it. And we certainly are all indebted to the Consolidated Gas Company and its officers and men for very much that successfully contributed to the unqualified success of the convention.

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CURRENT MENTION.—

MR. CHARLES F. LACOMBE, we are glad to announce, has been appointed Chief Engineer of Light and Power, in charge of the electrical divisions of that department in all the boroughs that go to make up Greater New York. This change (or rather promotion) goes to show that Commissioner John H. O'Brien, of the Department of Water Supply, Gas and Electricity, is quite above the practices of the ordinary politician, for in thus giving freer and fuller scope to his efficient Deputy's sway, he has had to resist much pressure from the powers behind the appointments. Mr. Lacombe is in every sense qualified to take practical charge of this huge division of the city's works, in that he has the confidence of the lighting suppliers and the respect and esteem of his subordinates. Another excellent thing done was the appointing of Mr. Hubert S. Wynkoop, Electrical Engineer in charge of the Brooklyn bureau, to the position of Assistant Engineer.

THE projectors of the gas supply for Sausalito, Cal., assert that the plant will be in readiness to meet the demands of consumers during the last week in December. If this promise is kept much pretty sharp work will have been performed.

MRS. ELIZABETH BUTTON, widow of the late Henry H. Button, the first President of the Milwaukee (Wis.) Gas Light Company, died at her home in Milwaukee the evening of the 24th inst. She was born in Providence, R. I., March 12, 1840, and was united in marriage to Mr. Button in 1849. A sister (Miss Phœbe A. Hearson) and a son (Henry Henry H. Button) survive her.

## Address of the President (Dr. Alex. C. Humphrerys) of the American Gas Institute, on the Occasion of Its Third Annual Meeting, New York, October 21-24, 1908.

Custom has so run for years that it has now become a specified requirement in most organizations such as this that their conventions shall be opened by the delivery of a formal address by the presiding officer. In meeting this requirement, the general practice has been for the presiding officer to consider some special technical question then prominent in the minds of his associates, or to submit a general resume of the year's progress in the field concerned.

In the address delivered before this Institute last October, President Clark, while considering some questions of general interest to those connected with the gas industry, chiefly concerned himself with the direct responsibilities of this Institute, especially the responsibility which it assumed when it, with its more complex and ambitious scheme of organization, was brought into life at the cost of destroying the American, Western and Ohio Gas Associations which, through the operation of their simpler and less pretentious schemes of organization, had proved their worth and capacity for service to the industry and the public.

In that address we were forcefully shown that, to adequately meet this particular responsibility, we must demonstrate, by our course in administering the affairs of this Institute, that the industry and the public had definitely profited by the amalgamation. In what I am about to say I shall follow the example of my predecessor in office, chiefly for two reasons:

First—The technical programme for this meeting is of such a character that I feel no special responsibility in that line in connection with my address.

Second—Although the preparations for, and the conduct of, last year's meeting were of a character to reflect credit upon any such institution as this, and although the work of the past year, as carried on by the several committees in charge, will, in the proceedings about to follow, be shown to compare favorably with the work done by other technical societies, I feel, in the words of President Clark, that still "the burden of proof is heavy upon us."

To-day the matter of vital importance to this Institute is not to be found in any technical questions, however important, but it is to be found in the questions involved in the conduct of the internal affairs of the Institute.

There is a special necessity to-day for the establishment and recognition from the outside of an organization entitled to speak on behalf of our industry with the voice of authority. It should be the definite purpose of this Institute to deserve recognition as—again quoting President Clark—"The authority in the United States on all questions relating to the manufacture, distribution and utilization of gas, including the keeping of accounts, and the relations between gas companies and consumers and gas companies and the city and the State."

It is not difficult to understand or believe that the American Gas Institute, carrying upon its roll of membership the representatives of the great majority of the gas companies of the United States, and not a few from other countries, can, through the exercise of a broad, fair, mutually loyal and efficient scheme of operation, so establish itself as the authority in the gas business, that where, in isolated cases, there may be a tendency on the part of some companies to adopt a policy at once unfair to the public and harmful to the industry as a whole, the pronouncements of this Institute may serve to check or correct such a tendency.

We cannot shut our eyes to the fact that the public and its legislative and executive representatives in the Federal and State governments have decided that public service corporations must conduct their affairs in accordance with some scheme, more or less developed, of uniform operation and control. The more we control ourselves along lines, uniform as to wise and efficient practice, the less ground there will be for the development of such extreme schemes of control as we now see exemplified in the operation of State commissions.

Certainly we are not yet prepared to acknowledge that control of public service corporations along the lines of late put into effect in certain States is likely to operate to the ultimate advantage of the industries concerned or the country at large.

There is one grave fundamental weakness in government by commission which must cause all of us deep concern quite apart from our special interest as industrial managers. I refer to the fact that the present tendency is to cover, in the same persons, the members of the State commissions, the legislative, executive and judicial functions, which, according to our republican form of government, should be carefully separated and held apart. So impressed as I am with the

radical nature of this weakness that I am prepared deliberately to express the opinion that, if this form of control is allowed to develop along these lines, then this is the beginning of the end of our form of government. If we are to continue the form of government laid down by the fathers and developed through the succeeding years of trial and test, we must be as vigilant to prevent the control of a beaurocracy as the control of a plutocracy. Let us hope that we can discern a more sane tendency in this connection since our last meeting, and and that it is coming to be recognized that these commissions, if they are to continue for the good of the country at large, as they well may, must be limited as to function and authority.

We are forced to acknowledge that, in the interest of efficiency, there is an apparent demand here as elsewhere for concentration of control. But here, as in every other department of human effort, if theory is to be realized in practice, the theory must be complete and must include a recognition in its terms of all the general and special conditions necessarily to be met in applying the original and undeveloped theory.

One general condition to be considered is that the members of a commission cannot possibly obtain such an intimate knowledge of the theory and practice involved in all the public utilities placed under their authority as to warrant them in exercising absolute and unlimited control. Another important condition is that no so-called uniform scheme of control and management can possibly be made to apply equally and fairly to all the companies, even of a single State, if for no other reason than the variation in local conditions.

For instance, it is highly important that every effort should be made to establish and maintain a uniform system of accounting, but the person or the organization which assumes that any such scheme, no matter how skillfully devised, can be made to operate automatically in all cases and without need for special adjustment and explanation in individual cases, will learn their error through convincing experience.

Unfortunately we have an example of this lack of practical experience, coupled perhaps with an overdeveloped desire to exercise all the powers conferred, or sought to be conferred, by the legislature, in the form of report for the half year ending December 31, 1907, issued to the gas companies by the New York Public Service Commission, First District. It would be interesting and instructive to all concerned to see how the statisticians of the Commission would themselves under take the task of compliance with this demand if they were placed on the other side of the problem, and also what would be the additional expense of operation by reason of compliance with this unreasonable and, in many features, useless requirement.

Some of the questions involved in government by commission can be answered from the experience so far gained. Of the State commissions now exercising control over our business, only the Massachusetts Commissoin has been in existence for any considerable number of years. It is to be particularly noted that this Commission has not been authorized, nor has the majority of its members generally shown a disposition to exercise the same measure of administrative control which has marked the course of the other State commissions. In my opinion, the fact that the Massachusetts Commission is to-day in existence can be attributed to this very difference.

Our companies continually have been put on the defensive by actual and threatened antagonistic legislative action—State and municipal. Fortunately, the State legislatures are not continuously in session and even while in session the legislators are unable to devote their entire attention to the public service corporations. Unfortunately, the public utilities commissions are always open to complaints against these corporations, and are governed by laws which practically offer an invitation to all wishing to complain, an invitation which the yellow journals, using as their tools the chronic objectors and professional reformers, who, like the poor, are always with us, accept as their selfish purposes suggest.

I speak well within bounds when I say that, in some cases, commissioners have acted as prosecutors rather than judges, no attempt being made to hold the scales of justice even, but rather to find sufficient plausible testimony upon which to base a decision against the company in response to public clamor. I am not laying the blame for all cause for just complaint upon the members of the commissions. The laws under which they operate have not infrequently necessarily led to vicious results. Much could be said in this connection, but I will only take the time to refer to one provision of the Wisconsin law governing the Public Utilities Commission of that State, unwisely taken as a pattern in other States. It reads as follows: "No public utility shall keep any books, accounts, papers or records of the business transacted than those prescribed or approved by the Commission." Some of the ardent reformers of the New York Legislature thought this was a wise provision as far as it went, but that it should go farther, so, as part of a great mass of legislation proposed at last session, we find in Senate Bill No. 911, the following: "Where the Commission has prescribed the forms of accounts, records and memoranda to be kept by said persons, corporations or municipalities, it shall be unlawful for them to keep any accounts, records or memoranda than those so prescribed." Fortunately, this New York bill, and much more of the same mischievous character, failed of passage.

These cases of unwise legislative effort may not seem to be serious, especially by comparison with much else that could be cited. But, as it appears to me, this serves as a perfect example of the desire on the part of some of our legislators to establish such a measure of control over the public service corporations as would prevent those responsible from exercising to the full their ability and capacity as industrial managers for the benefit of the public and of their employers whose investments are at stake.

In Wisconsin the companies are prohibited from using any books, accounts, papers or records not authorized by the Commission, no matter how necessary it may appear to the manager of a property to use some particular form of record to meet some particular case. In New York, if the law referred to had passed, not even memoranda could have been lawfully made unless the Commission had first approved. Especially to those of us who have been responsible for uniform management of a number of properties, calling for constant change and development of forms of blanks and records, and the temporary and immediate use of memoranda to meet special cases, such a measure of interference spells nothing less than tyranny. This, in as far as the principle is concerned; in practice, it is fortunate that the Wisconsin Commission have given evidence of an earnest desire to deal justly, sensibly and fearlessly with the problems placed before them, and we may hope that New York and other States, while hesitating to follow the lead of Wisconsin's Legislators, may emulate the fair practice of Wisconsin's Commissioners.

We may congratulate ourselves that during the past year there has been some change for the better in the attitude of the public and its governmental representatives with regard to control of public service corporations. The indiscreet amateur reformer, the over-confident professor of economies, and the blatent demagogue are not so firmly in the saddle as they were a year ago. In this State an encouraging comparison can be made between the late Commission of Gas and Electricity, and its successor in the district outside of New York city, the present Public Service Commisson, Second District. I make the comparison with the No. 2 Commission because I happen to have had opportunities to make the necessary observations in connection with matters outside the jurisdiction of Commission No. 1.

*The late New York Commission made a record which went far to discredit government by commission.* The successor of this Commission in District No. 2 has demonstrated how much depends upon the personnel in this scheme of control. The members of this Commis sion have shown not only a desire, but a determination, to deal justly in the cases brought before them, and they have indicated that they appreciate that, no matter what authority may be conferred upon them by the law makers, they, as individuals, cannot expect, in the time at their disposal, to qualify as experts in all the industrial branches included in their province.

Here in this comparison we have an opportunity to see how much depends upon the character of the men selected to fill these offices. But if the scheme as a whole is dangerous in principle, we must favor its modification, even though the evils may be minimized temporarily by the wise course followed by the men in office. Sooner or later, if there is the opportunity for unjust and ruinous control to exist and grow, the men to take advantage of such a condition surely will be found in office.

In the meantime, we should strive wisely, continuously, strenuously to so build up this Institute as an authority that we can exert a wholesome influence with the commissions as they now exist and also be in a position to convince the public and the public's servants that no such measure as extreme control through commissions as is now advocated, and was still more strenuously advocated a year ago is to the interest of the country at large. In considering the disadvantages of commission control, we must not lose sight of the advantages. To every question there are two sides.

One of the evils with which this country has been threatened is municipal ownership. We might well expect that the municipal ownership propaganda would make little progress in connection with

commission control for, if these commissions collect their data even according to such a scheme of uniformity as is possible, the result should be to defer the establishment of municipal ownership in this country until we had at least made considerable more progress in the direction of the millennium.

In passing, let me say that we have another protection against municipal ownership in the report of the Commission appointed by the Civic Federation. This matter also was referred to in President Clark's address, but since our last meeting there have been developments in this connection which are of great interest. I earnestly advise you one and all to study the record of the investigation, and especially to study the individual analyses of that record, two on each branch of the investigation, one by the advocate of municipal trading and one by its opponent.

Before accepting the matter presented by the municipal ownership labor investigator, I particularly advise you to read a recently published supplemental analysis of the labor report written by Mr. J. H. Sullivan, the other labor investigator. Furthermore, there is reason to believe that some of those quoted and relied upon as witnesses in the analyses written by the municipal ownership advocates are preparing statements to show that they have been misquoted and misinterpreted. I advise you to be on the lookout for these supplemental papers.

In studying this report, it may well be borne in mind that the municipal ownership advocates were given more than fair play in the gathering of data and the preparation of the reports and analyses; and still, with the advantages conceded to them by their associates representing private ownership and the further advantages seized by them, the final report of the majority, as signed by these municipal ownership advocates, "Makes no claim that municipal ownership of gas, electric light or railways ever has been or ever will be beneficial to the consumer or the taxpayer."

No man interested in the question of municipal ownership of public utilities can afford to ignore this report, including its accompanying papers and the supplemental papers, present and prospective. Especially should the final report of the majority be studied in connection with the uncompromising and convincing minority report.

Time does not now permit anything approaching an exhaustive discussion of government by commission and municipal ownership. I have been led to touch upon these questions chiefly that I might reenforce and emphasize the point as made in last year's presidential address that it behooves the Institute constantly to keep in mind the peculiar responsibility resting upon it to establish itself firmly as the authority to be reckoned with in the consideration of all questions pertaining to the gas industry.

Now let me briefly refer to a few of the matters which have, during the year of my presidency, forced themselves upon my attention in this connection. I shall speak frankly, as I consider the case warrants, and I ask for your indulgence in so doing.

We must so conduct this Institute as to appeal to the proprietors and managers of the small undertakings as well as to those of the largest undertakings. We must not lose sight of the apparently simpler problems while laboring over the more complex and advanced problems. We must carry on our work between our annual conventions and conduct our meetings so as not to discourage the younger men and the men in charge of smaller properties from presenting for investigation and discussion their particular problems and difficulties.

We must remember that, while there is and will be constant necessity for research, the engineer and manager must be, first of all, commercially practical in the application of the results of scientific research. We must remember that the engineer is more the applier of science than he is the scientist.

We must of necessity conduct a large and complex organization like ours through a few men selected each year from the membership at large, and naturally the men so selected will, as a rule, be chosen from those who have gained some prominence in the industry or in our meetings. But it is for these men to do all in their power to encourage those not so well known to come forward with their questions and suggestions, and to so enlarge the working units of the organization until the roll of workers shall include all of those willing and able to do more than sit still and profit by the labor of others. New blood must be constantly brought into the working body of the Institute, and the men who can supply new blood of the required quality must be encouraged to show their quality.

On the other hand, in carrying on our work, we must recognize the advantages to be gained by availing ourselves of the facilities and instrumentalities within the command of the larger separate companies and the parent corporations operating many companies, but beyond the reach of the smaller separate companies. And those not connected with these more powerful corporations may well be grateful for the benefits so obtained and thus be moved to make greater exertions in the effort to do their share of the work, the responsibility for which rests upon all.

By some of our members these more powerful corporations have been criticized for the active part taken in this Institute and the associations which preceded it. Rather should we not all be grateful for the efficient service rendered by the representatives of these corporations? Most of these larger corporations contribute through their representatives far more than they receive. If they elected to pursue such a narrow and selfish policy, they could confine their researches and discussions to their own meetings of engineers and managers and so deprive the gas industry at large of much valuable information—information which, in many cases, has been collected at great cost. Where so much is contributed, it is natural and right that those who so contribute should be influential in determining the Institute's policies and methods of procedure.

To illustrate the points just made and to reinforce my appeal for a more general distribution of the work of the Institute, let me give you the result of an analysis of the papers, reports and short topics presented at the meetings of the American Gas Light Association and this Institute between the years 1895 and 1907. The total number of such offerings was 114, out of which the representatives of one powerful corporation and its associated interests presented 34, and the representatives of another powerful concern presented 18, a total of 52, or nearly 50 per cent. of the total contributions presented by the representatives of two interests. To show that where there is the inclination, the members not connected with these more powerful interests can do their share, I may mention that the representatives of one concern not so connected contributed 12 of the remaining 64 contributions.

Now let us consider the list of papers prepared for this meeting. Of the ten regular papers, eight have been prepared by men connected with one corporation, and in the general reports and special reports of the sub-committees of the Technical Committees, the same corporation is fully represented.

Do not misunderstand me. I am not minimizing the efforts of the others who have done such splendid work in past years and in preparing for this meeting, but I am making the point that those who have not been workers in the past should recognize the unselfish spirit in which these great corporations assist us through their representatives and the instrumentalities at their command, and then resolve that they will give expression to this appreciation by doing their share in turn, even if individually they are able to do what to them seems little by comparison.

It may be urged that more papers could be obtained from the membership at large if greater effort were made by those directing the work. As far as my experience goes, such effort is made every year, but, by reason of the insufficient response made from other quarters, those carrying the responsibility are obliged to fall back upon the representatives of these larger corporations. This emphatically was the case this year.

A certain definite complaint was made to me this year, shortly after my election, to the effect that the representatives of the smaller companies were not encouraged to contribute to our meetings and their needs were not sufficiently kept in mind. I cannot acknowledge the justice of this complaint as to the past, and it certainly cannot be maintained as to this meeting, for it will be seen that a number of the papers prepared for this meeting are of equal interest to the smaller companies as to the larger ones. While some of the papers stand upon a high plane technically, others are of such a practical character that not a member of this Institute can fairly complain that theory is placed ahead of practice. But most of these papers had to be prepared by the representatives of one of these large corporations as already shown. One gentleman who voiced this complaint was urged to submit a contribution along the lines he suggested, but he declined, as did others who were approached.

We must so conduct this Institute as to win and hold the confidence and support of the more powerful corporations represented in our membership. This Institute cannot hope to be a representative body without their support In spite of opinions to the contrary, I believe that this support can be best retained by inducing the members other than the representatives of these interests to do their full share in the work of the Institute.

There is the opportunity for nice discrimination in connection with questions that must constantly arise as to the scope of this Institute's

activities. Certainly our transactions should constantly enrich t literature of our industry, and we should develop a system of reference which would serve to make more and more readily available to our members the literature of the industry, past, present and future. We should aim to build up a reference system that will be available for our members in connection with questions involving our relations with governing bodies. But having thus helped our members to acquire the necessary general information, the Institute's officers should not be required to apply this information to the solution of any particular problem requiring for the purpose a detailed study of all local conditions. Here is where the work of the Question Box and the Bureau of Information could be readily extended beyond their legitimate territory. Manifestly, no company, and no officer of a company, can fairly expect to have local and individual problems solved for them for a yearly fee of $10.

We must be prompt to recognize where our methods of procedure are inefficient and we must be untiring in our efforts to discover and apply the required corrections.

In connection with affiliation and sectional sessions, there are problems yet to be solved which will require, for their solution, the exercise in large measure of patience, open-mindedness and common sense.

If we are to succeed in developing a working scheme of affiliation, we must be satisfied with measures that will secure an efficient co-ordination of the efforts of all concerned while interfering as little as possible with the principles of home rule.

After full and earnest deliberation, the Directors, acting with the Committee of Arrangements, have adopted a programme for this meeting which gives us three working days, and a fourth day for an excursion, which, apart from the recreation feature, will afford the members an opportunity for closer association and personal conferences.

The programme for the first three days gives us 12 meeting hours, supplemented by an inspection trip to the Astoria plant, which will present an opportunity of great educational value.

Should we be fortunate enough to consume only 2 hours on routine business, we shall have then only 10 hours left for the presentation and discussion of papers and technical reports; little enough, when we reflect that, to participate in these 10 hours of conference, our members came at large expense from all parts of the United States and points outside our borders. Certainly, then, no effort should be spared to use this time to the greatest possible advantage. It seems to me that the methods now pursued as to distribution of papers in advance of the meetings and the reading of these papers at length at our meetings are inconsistent and wasteful of money and effort. If, at large expense, the advance distribution of papers is to be continued, then only abstracts, carefully prepared by the authors, should be read at the meetings. This course is successfully followed by many technical societies.

Before closing, let me say a word on behalf of the work performed under the direction of the Trustees of the Gas Educational Fund. This should appeal to every gas man who believes in advancing the interests of the industry and in helping the young men connected with it to better prepare themselves for their adopted vocation. This work should be put upon a stronger and more permanent financial foundation. The Trustees should have an endowment in some measure commensurate with the importance of the work in hand. If the importance and high character of the work were appreciated by the gas men of the United States, such an endowment could be secured that it would not be necessary for the Trustees to go around every 5 years hat in hand, and also that the scope of the work could be materially broadened and extended. Our Constitution states that one of the objects of our organization is "the education of employees of gas companies to enable them to better perform their duties." Let us not be satisfied with the subscription annually made by the Institute, but let us individually endeavor to secure the support of the companies we represent, comparatively few of whom are now helping to carry the burden.

In conclusion, then, let me express the hope that we will continue our efforts to build up the Institute as the national authority in gas matters and that the membership will, as a unit, in spite of differences of opinion which must as a necessity exist, work together loyally and disinterestedly to this great end.

With this purpose continually in mind, let us each year frankly and courageously review the paths followed, to see if we have traveled in the right direction and so far as our strength and opportunities have permitted.

## The Theory of Benzol Enrichment.

[A paper prepared by MR. E. H. EARNSHAW (Newark, N. J.), for the 3d Meeting, American Gas Institute, New York, Oct. 21 to 24, 1908.]

The whole matter of benzol enrichment is governed by a few comparatively simple physical laws. While a knowledge of these laws may not be sufficient to enable one to predict definite results, still a consideration of their application will clearly point out the reasons for many of the apparently contradictory experiences reported.

Every volatile liquid gives off a vapor at all temperatures. This evaporation is slow at low temperatures, but increases rapidly as the temperature of the liquid approaches its boiling point. The force exerted by the vapor in making room for itself by displacing the surrounding air or gas is called vapor tension and increases as the temperature rises. Every mixture of gas and a vapor obeys the following two laws, known as Dalton's Laws:

1. The tension, and, consequently, the quantity of vapor which saturates a given space, are the same for the same temperature, whether this space contains a gas or is a vacuum.

2. The tension of the mixture of a gas and a vapor is equal to the sum of the tensions which each would possess if it occupied the same space alone. By the application of these laws we are able to predict with certainty the amount of any vapor required to saturate a given volume of gas at any designated temperature. A familiar example is to be found in the table of correction factors which we all use for determining the volume of gas at 60° equivalent to 1,000 cubic feet at another temperature, the gas in both cases being saturated with moisture. The tension of water vapor has been accurately determined for all temperatures, and in calculating the correction factor allowance is made for the volume of water vapor present before calculating the change in volume of the gas due to difference in temperature. For example: 1,000 cubic feet of gas at 82° and 30 ins. barometer, consists of 963.6 cubic feet of gas + 36.4 cubic feet water vapor; at 60° the total volume will be 941 cubic feet, consisting of 924.7 cubic feet gas + 16.3 cubic feet water vapor.

In each case the weight of gas is the same, and the reduction of its volume is due only to the change in temperature; but nearly one-half of the water vapor has been condensed to water and is no longer present with the gas. If now the 941 cubic feet of gas and water vapor at 60° is again raised to a temperature of 82°, but out of contact with the condensed water, it will occupy a total volume of 980.6 cubic feet, consisting of 963.6 cubic feet gas + 17 cubic feet water vapor. This is now an unsaturated mixture and is capable of taking up and carrying 19.4 cubic feet additional water vapor, and thus increasing its volume to the original 1,000 cubic feet.

The laws governing the enrichment of air or a fixed gas, like blue water gas with pure benzol, are exactly similar to the case of water vapor. The vapor tension of pure benzol has been accurately determined for various temperatures, and it is entirely possible to predict with certainty the volume of benzol vapor that can be carried with the gas at any determined temperature. Consequently, the amount of enrichment in candles can be predicted, and with equal certainty the loss in candle power that will be sustained by cooling the mixture of gas and vapor to a temperature below its point of saturation. Unfortunately, however, the problem as usually encountered, is far more complex. The gas to be enriched is not a simple fixed gas, but is already more or less completely saturated with vapors belonging to the same series of hydrocarbons as benzol. The so-called benzol used for enrichment is not pure benzol, but is chiefly a mixture of benzol, toluol and xylol. These three hydrocarbons belong to the same series, in a liquid form dissolve perfectly in all proportions, but have different boiling points and, consequently, different vapor tensions at the same temperature.

*Certain Characteristics of Benzol, Toluol and Xylol.*

| | Benzol. | Toluol. | Xylol. |
|---|---|---|---|
| Chemical formula | $C_6H_6$ | $C_7H_8$ | $C_8H_{10}$ |
| Specific gravity, liquid at 60° | 0.8846 | 0.8720 | 0.8692 |
| " " vapor | 2.6953 | 3.1792 | 3.6630 |
| Boiling point | 177° F. | 230° F. | 287° F. |
| Weight of 1 gallon, pounds | 7.37 | 7.26 | 7.24 |
| " " 1 cubic foot vapor at 60° F. | .2064 | .2434 | .2805 |
| Cubic feet vapor from 1 gallon | 35.57 | 29.76 | 25.77 |
| Vapor tension at 60° F. in inches of mercury. | 2.346 | 0.720 | 0.236 |
| Cubic feet vapor in 1,000 cubic feet saturated mixture of gas and vapor at 60° and 30-inch pressure | 78.20 | 24.00 | 7.88 |

Regnault has shown that the vapor tension of mixed liquids depends upon the mutual solubility of the liquids in accordance with the following laws:

I. Where two liquids exert no solvent action on each other—such as water and benzol— the tension of the vapor which rises from these is nearly equal to the sum of the tensions of the two separate liquids at the same temperature.

II. When two liquids dissolve in all proportions—as benzol and toluol—the tension of the vapor of the mixed liquid is intermediate between the tensions of the separate liquids. The first law of Regnault shows that the presence or absence of water vapor has no effect on the enrichment with benzol, but it is the operation of the second law that causes all the trouble and uncertainty. The exact composition of the enriching liquid being usually unknown, it would be impossible to predict its vapor tension for any particular temperature, and, consequently, its permanent enriching effect would be uncertain, even if the gas to be enriched were free from any other similar vapor. But if the gas to be enriched is a water gas or coal gas already saturated with vapors of the benzol series, the problem becomes still more complicated. Let us consider such a case.

Take a water gas already saturated with hydrocarbon vapor of, say, 20-candle power, and it is desired to effect a permanent enrichment of 2 candles by the use of commercial "benzol." Let us suppose in the first place that the tension of the vapors, with which a gas is saturated, already present in the gas is the same as the vapor tension of the enriching liquid. It is evident in this case that no enrichment can be obtained, since the quantity of vapor of a given tension required to saturate a gas is always the same for the same temperature, and this fixed amount is already present in the gas.

If the vapor tension of the enriching liquid is higher than that of the hydrocarbons in the gas, a degree of enrichment can be obtained.

The commercial success of such enrichment will depend upon the difference in vapor tension. It is evident that an increase in quantity of vapor, and, therefore, an increase in candle power, can only be obtained by increasing the vapor tension of the hydrocarbons in the gas. If the tension of the enriching liquid is very high, the addition of a small amount may raise the tension of the combined vapors so that the gas will carry the amount of vapor necessary to give the desired increase in candle power. In this case the full enriching value of the added vapor is developed.

If the vapor tension of the enriching liquid is but little higher than that of the vapors already in the gas, then the desired enrichment can only be obtained at considerable cost and the full value of the enriching liquid cannot be utilized. Enough of the benzol must be added to bring the average vapor tension up to the required point, but as the total quantity of vapor will now be much greater than the gas can carry, the surplus will be condensed. This condensate will have a tension higher than that of the original vapor in the gas, and lower than that of the enriching benzol.

If the tension of the benzol is less than that of the vapors in the gas, not only will there be no enrichment but there will be an actual loss of candle power. This is evident because any addition of this benzol will lower the average tension of the vapors and reduce the quantity that the gas can carry, and there will be condensed from the gas a quantity of liquid greater than the amount of benzol added.

So far, I have assumed that the gas remains at a constant temperature after enrichment, but this is not usually the case. The added candle power is, of course, permanent for any higher temperature; but if the gas is subjected to a lower temperature, the change in vapor tension must necessarily cause a deposition of liquid hydrocarbons and consequently a loss in candle power. No one can predict with accuracy how great the loss will be for any given drop in temperature and this can only be determined by actual experiment.

At first, the hydrocarbons condensed from the gas consist chiefly of toluol and xylol, but as the temperature is lowered and the deposition of vapors continues, the proportion of benzol constantly increases both in the hydrocarbons of the condensate and in the vapors remaining in the gas.

To understand clearly the cause of this action, let us assume that the lowering of the temperature occurs in successive steps. After each drop in temperature, the gas contains more hydrocarbon vapor than the quantity corresponding to the average vapor tension at the lower temperature and the surplus is immediately condensed. The tendency is for the vapors of lowest tension to condense first, leaving the gas saturated with vapors of a higher tension. The operation of the law of average vapor tensions, however, causes an effort at re-adjustment, to the end that the average vapor tensions of the condensed liquid and the hydrocarbon vapors may become the same. If the gas should remain in contact with its condensate for a sufficient length of time, this re-adjustment would undoubtedly become complete, but in actual practice it is only partially effected, and the condensate contains a greater proportion of the hydrocarbons of low vapor tensions than is found in the mixture of vapors remaining in the gas. It is also clear that each successive condensate will consist of hydrocarbons of a lower average boiling point than the preceding one.

To determine the quantity and character of the hydrocarbons condensed from water gas by lowering its temperature, the following experiment was made:

A water gas of approximately 24-candle power, made from Texas oil, was passed through a cooling coil arranged in such manner that the condensate deposited between two determined temperatures could be collected and measured. Condensate of oil from water gas:

| | Candle Power. | Gallons Condensate, per 1,000. | | Average Candle Power Lost in Candles. | Apparent Enriching Value of Cond. Oil in Candle Feet per Gallon. |
|---|---|---|---|---|---|
| 70° F. to 60° F. | 24.2 | .063 | | .... | .... |
| " " " | 23.3 | .065 | .064 Av. | 0.91 | 14,200 |
| " " " | 23.1 | .064 | | .... | .... |
| 60° F. to 50° F. | 24.4 | .079 | | .... | .... |
| " " " | 24.7 | .082 | | .... | .... |
| " " " | 23.6 | .075 | .077 " | 1.55 | 20,100 |
| " " " | 23.6 | .072 | | .... | .... |
| 50° F. to 40° F. | 24.0 | .074 | | .... | .... |
| " " " | 23.9 | .079 | .073 " | 1.72 | 23,500 |
| " " " | 23.4 | .065 | | ... | .. |
| 40° F. to 30° F. | 23.0 | .071 | .071 " | 2.46 | 34,600 |
| 70° F. to 30° F. | .... | .... | .285 " | 6.64 | 23,300 |

It will be noticed that the quantity of condensate collected for each 10° drop in temperature remains very constant, but the apparent enriching value increases as the temperature falls. This is probably due chiefly to the greater quantity of high tension hydrocarbons in each successive condensate.

The distillation of the condensate between 70° F. and 50° F. and between 50° and 35° shows very clearly the increase in the percentage of benzol in the condensate collected between the lower temperatures.

| | Distillation Test of Condensates from Water Gas— Bet 70° and 50° F. | Bet. 50° and 35° F. |
|---|---|---|
| To 202° F. (chiefly benzol)... | 17.1 per cent. vol. | 28.1 per cent. vol. |
| 202° to 260° (chiefly toluol).. | 28.4 " " | 43.2 " " |
| 260° to 302° (chiefly xylol)... | 33.7 " " | 16.7 " " |
| Above 302° (heavy tar oils, etc.)..... | 13.9 " " | 6.6 " " |

These principles cover in brief the whole theory of benzol enrichment, and their application to practical problems may explain some apparent contradictions and perhaps prevent some of us from attempting the impossible.

For example, it is evident that disappointing results are sure to follow any attempt to enrich at the works water gas which is subsequently to be exposed to a considerably lower temperature. A better effect will be obtained by enriching at an outlying holder station since the gas has been exposed to a lower temperature than at the works, but even in this case a high grade of benzol will be required during the winter months. During the summer months it is quite possible to satisfactorily add a certain amount of enrichment to any gas which has been exposed during manufacture to a lower temperature than it will subsequently meet in distribution, and in this case a benzol of low grade will frequently do the work. In general, any gas can be economically enriched with benzol if it is not already saturated with hydrocarbon vapors and will not subsequently be exposed to a temperature that will lower the tension of the mixed vapors so that they will condense out in a liquid form.

I have in mind an instance where coke oven gas is distributed a distance of 70 miles at an initial pressure of 30 pounds. During the cold weather this gas suffers a loss of candle power due to the compression and subsequent cooling, and it reaches the distribution holder at the end of its journey considerably under-saturated with hydrocarbon vapor. It has been the practice to restore the lost candle power by enrichment with benzol, and for this purpose a high grade "90 per cent." benzol" was at first employed. Subsequently it was found that the gas was so far from being saturated with hydrocarbon vapors that a 60 per cent. benzol gave a satisfactory permanent enrichment. During the spring months the ground is still cold, causing a loss in candle power, though less than during the colder months, and it was found that the 30 per cent. benzol collected from the pipe line drips in the winter was good enough to give the small permanent enrichment then desired.

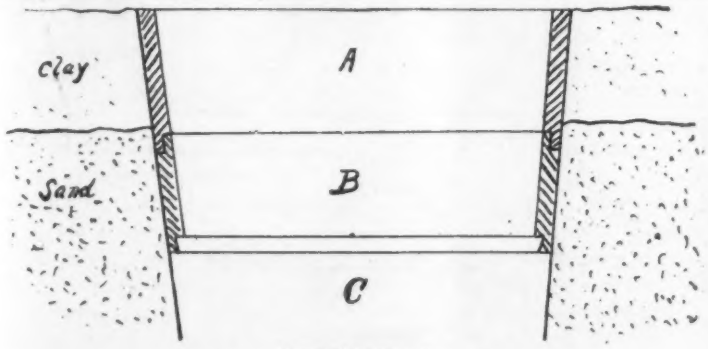
The approximate composition of the several benzols used for enriching in this particular case are shown by the following distillation tests:

| | 9 Per Cent. Benzol. | 50 Per Cent. Benzol. | Drip Oil. |
|---|---|---|---|
| To 181° F..... | 1 | 2 | 3 |
| 181° to 194°..... | 50 | 6 | 3 |
| 194° to 212°..... | 35 | 53 | 26 |
| 212° to 230°..... | 8 | 25 | 18 |
| 230° to 248°..... | 0 | 12 | 14 |
| Above 248°..... | 0 | 5 | 35 |

In conclusion, I wish to emphasize that every case in which it is desired to use commercial benzol as an enricher must be treated as an independent and separate problem and considered in the light of the known laws. The degree of saturation of the gas, the amount of enrichment desired, the temperature to which the gas will be exposed after enrichment, the grade of benzol available—these are the controlling factors, and they must all be reckoned with.

## Wrinkle Budget for 1908, Submitted by Mr. Milan R. Bump, as Editor of the Wrinkle Department, The American Gas Institute.

*No.* 1. *Method of Constructing Brick Tanks or Wells.*—We have recently constructed a tar well, 26 feet diameter and 16 feet deep, the soil being 5 feet of clay, all underneath sand and gravel. We constructed it as follows: First, a circular hole was dug 4 feet deep, exactly round, the sides being trimmed smooth and sloping 3 inches in 4 feet. As soon as this was finished it was lined with 9 inches of brickwork, laid in Portland cement, the first two courses being only 4 inches thick. Starting at the bottom of this, we again excavated 4 feet deep, sloping the walls the same way, and of such a size as to bring the brickwork fair with the first piece that was laid. The conical shape of the wall furnished the necessary support to prevent the brickwork from going down when it was undermined. This process was repeated until the well was full-depth, and it could have been carried much deeper. The 4-inch bottom course provides a tight joint between the different layers of brickwork by causing one to lap over the other. The sketch shows the well as it looked when




**Wrinkle No. 1.**

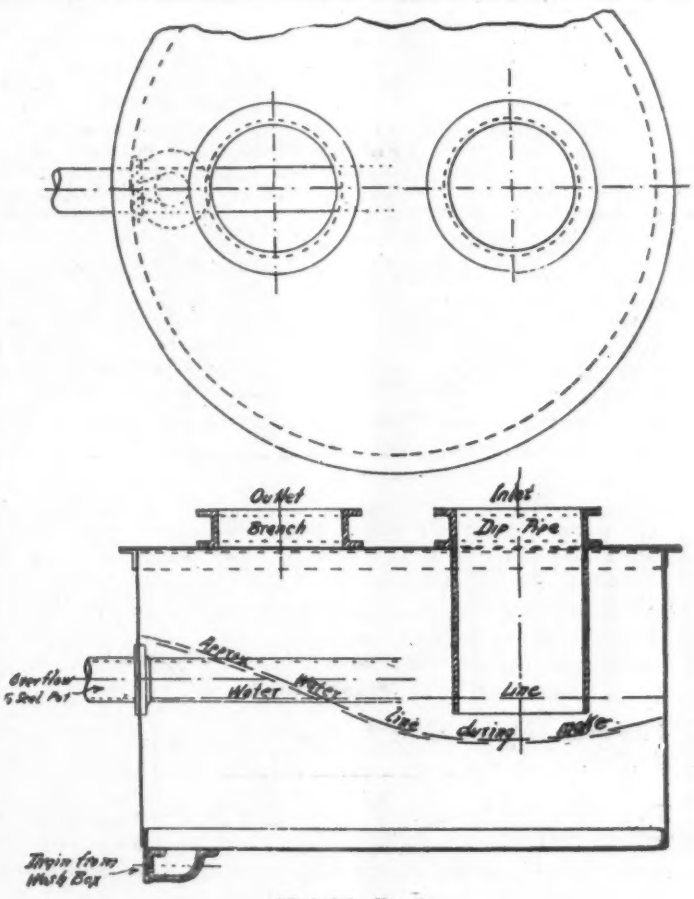
it was 12 feet deep, the ring *A* being the first one put in, *B* the second, the space *C* being ready for the third.

In parts of the well we found the sand and gravel very much disposed to run. In such places, instead of excavating 4 feet deep, we went only 2 feet deep, a laborer working immediately ahead of the bricklayer, keeping the wall trimmed up to shape ready for him. In this way the sand and gravel were not allowed time enough to dry and gave no trouble by running.

I feel confident that a large gasholder pit can be built in this way, thus getting rid of the trouble and expense of sloping the banks and replacing and ramming the back fill, and at the same time enabling the engineer to place his holder pit within a few feet of the property line on all sides. I believe that at least one-third of the cost of a holder pit could be saved by constructing it in this way; in addition to which would be the assurance that the earth outside was in immediate contact with the masonry walls.—DONALD MCDONALD, Louisville, Ky.

*No.* 2. *Automatic Water Overflow from Washbox.*—Most water gas plants are now equipped with tar separators, and it is the custom to pump the separator water over and over again to supply the washbox. A liberal stream of water is pumped to each washbox, so that there shall be no doubt about maintaining the seal.

As soon as the run goes on, the flow of gas through the dippipe of the washbox forces the water away from the dippipe and raises it around the sides of the washbox. There is much surging of this water, and the water line assumes approximately the position shown in the sketch.




**Wrinkle No. 2.**

In the usual washbox all that water that has a tendency to rise above the level of the overflow runs out into the separators, thus reducing the quantity of water in the washbox. It is further reduced by the amount of water picked up by the gas in its passage through, less the tar that is deposited in the washbox by the gas.

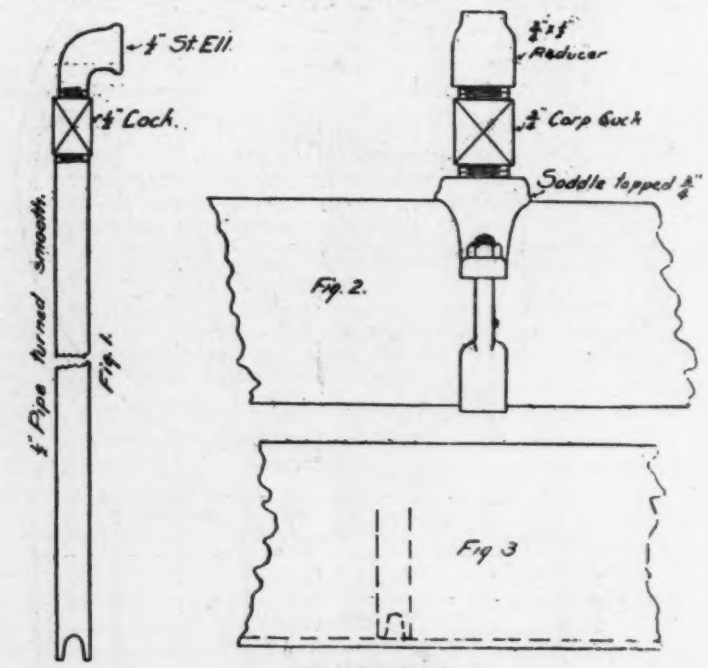
The quantity of water that must be admitted to the washbox during the run must be sufficient to restore to the washbox the amount of water which has escaped from it for the reasons given above.

It is customary to set the water valve so that this flow will be continued throughout the blast. The present wrinkle is designed to reduce the quantity of water discharged from the washbox during the run and hence the quantity of water necessary to replenish that lost. This is done by continuing the overflow pipe inside the washbox to a point close to the dippipe, as shown in the sketch. In this case there is no gushing of water from the overflow during the first period of the make, so that the water required to replenish that wasted is only what is necessary to make up for the water taken up by the gas. From time to time the tar must be drawn off from the bottom drain, which, of course, should not be sealed off in the overflow pot.

With this device not more than one-half the quantity of water will be required, making it possible in new plants to reduce materially the expense of construction and ground area required for the separators, since much less water is to be separated from the tar; and in growing plants, a reduction in the pumping capacity, or *vice versa*, increasing manufacturing capacity for the same pumps.—THE UNITED GAS IMPROVEMENT COMPANY, The Philadelphia Gas Works, Manufacturing Department.

*No.* 3. *Drip for High Pressure Main.*—No 1 (Fig. No. 3) shows a piece of ½-inch pipe about 2½ or 3 feet long, turned smooth in a lathe. This pipe is notched at the bottom so that when it rests on the inside of the main, the water can pass up into the tube. At the top there is a ¼-inch cock, into which is screwed a ½-inch street-ell.

No. 2 shows a saddle tapped ¾-inch. Into this is screwed a ¾ inch corporation cock, and on the upper end of the cock is screwed a ¾-inch by ½ inch reducer. The reducer serves as a stuffing box, having some candle wicking on the inside. After the main has been tapped with a ¼-inch drill, the tube is placed inside the reducer, which is then tightened up. The corporation cock is then opened and the tube is driven down into the inside of the main and rests on the bottom as shown by Fig. 3. When the stuffing box is tightened sufficient so that no gas is escaping, the ¼-inch cock at the end of the tube is opened




**Wrinkle No. 3.**

and the water is forced out by the pressure of the gas.—C. B. STROHN, Elgin, Ills.

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*No. 4. Scrubber Sprays.*—The advocates of "non-stratification" theories to the contrary notwithstanding, there is a tendency upon the part of currents of gases to channel and chimney *A*, through opposed currents *B*, through water or water vapor, and conversely to be channeled through by water or vapor, no matter how diminutive the chimneys or currents.

It is a principle of mass action that the finer the dissemination of two or more elements the more complete and intimate their intermixture, hence, with water scrubbing or gas washing, the finer the mist of the water the more complete the saturation or supersaturation of the gas, with consequent precipitation of foreign matter mechanically entrained.

Another physical feature consists in the fact that where water mist is used the union is more thorough and at the same time more gentle, the bubbles and globules of hydrocarbon matter suspended in the gas being slowly and easily dissolved and not burst by the violent action of a relatively large or solid mass of water. The result is that the tar and lampblack suspended in the shape of very large globules or "fog" are removed with a minimum abduction of the valuable hydrocarbon oils or illuminants.

However correct this rather obstruse "theology" of gas cleaning may be, it is a fact that misting water in scrubbers under practical working conditions effects the maximum of purification and condensation with a minimum of loss in precipitation.

To this end is submitted a sketch (Fig. 4) of a misting spray, designed to operate at a pressure of from 60 to 125 pounds of water (the higher the better), the spray being also of peculiar value in purification of producer gas and blast furnace gas, where they are sometimes superimposed in the pipe lines as well as in the scrubber tanks.

Another type of spray (Figs. 5 and 6), which has been very successful for scrubber work, consists merely in one of the small cast iron sprays used for watering lawns in connection with a garden hose, used in this instance in an inverted position. The tangential cone throws an "umbrella" spray and is exceptionally free from "fogging" or stoppage.—M. N. LATTA, Olympia, Wash.

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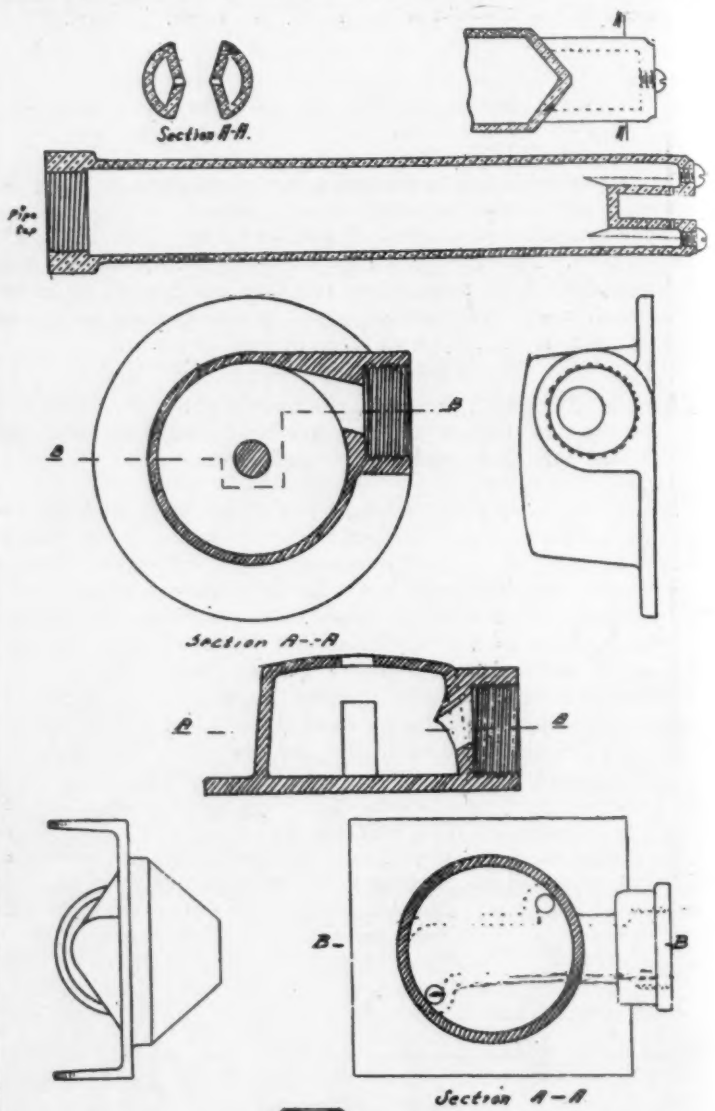
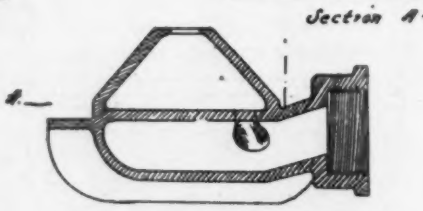
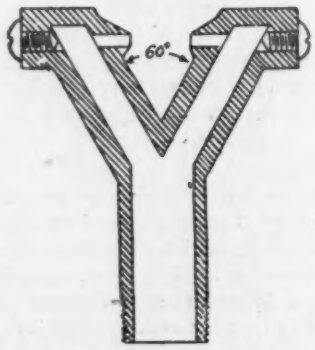
*No. 5. Steam Nozzle Under Water Gas Generator.*—For admission of steam under a water gas generator the writer has found that some device for diffusing the steam beneath the grate bars tends greatly to prevent its channeling through the fuel bed and the consequent production of $CO_2$, clinker and "dead spots." To this end he suggests the use of the steam spray shown in the illustration, one or more of which may be used at the bottom of the generator. Great care should be taken in boring these sprays that their orifices be absolutely concentric. The use of these sprays causes the steam to rise in a dense cloud or atmosphere, rather than to impinge in chimneys through the grate bars. There is also a moisture separating effect due to both the



**Wrinkle No. 4.**




**Wrinkle No. 5.**

mutual impingement of the opposed steam nozzles, the change in velocity and direction, to the wire drawing and to gravity.—M. N. LATTA, Olympia, Wash.

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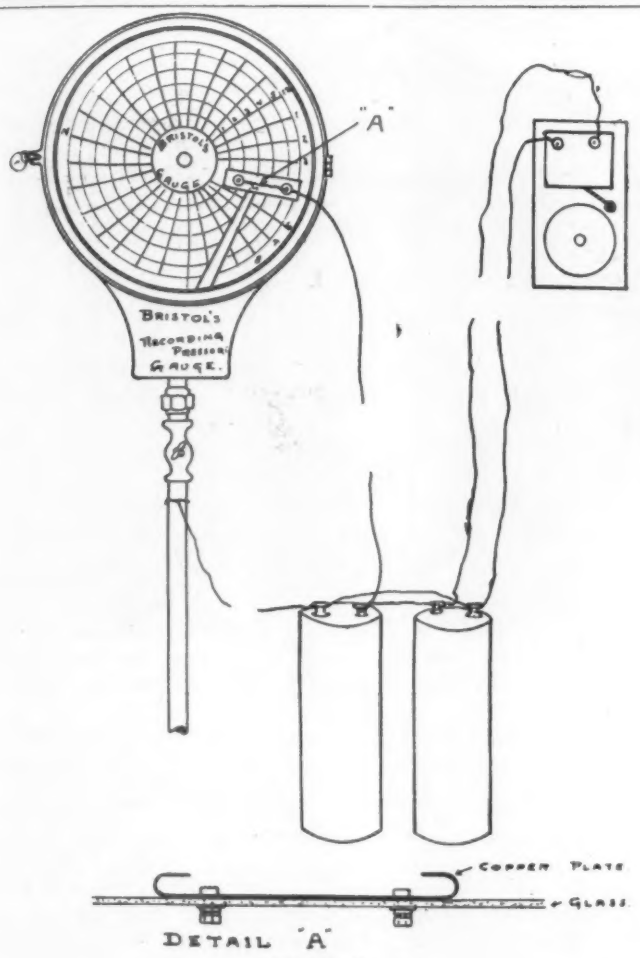
*No. 6. Automatic Alarm on Works' Pressure Gauge.*—This device is designed to insure against excessive fluctuation in street main pressures during any hours when no attention is being given to the governor. The maximum and minimum allowable pressures are fixed by the location of contact points of the copper strip *A*. The copper strip is insulated from the metal portion of the gauge by the glass front. One wire is fastened to the gauge and the other to the copper strip, and whenever circuit is cloud or atmosphere, rather than to




**Wrinkle No. 6.**

impinge in chimneys through the grate bars.—L. B. MOOREHOUSE, San Antonio, Tex.

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*No. 7. Method of Threading Pipe.*—By bolting the two plates to the stocks, removing the handle, and using the Mueller ratchet-handle, the pipe can be threaded without digging a large trench to swing the handle usually on the stocks. The stocks and dies, and the Mueller tapping machine to which the ratchet handle fits, are usually carried in the service cart, so that, with this proposed tool, it is unnecessary to carry any special tools for threading service pipes in trenches.—GEO. BEADENKOPF, Baltimore, Md.

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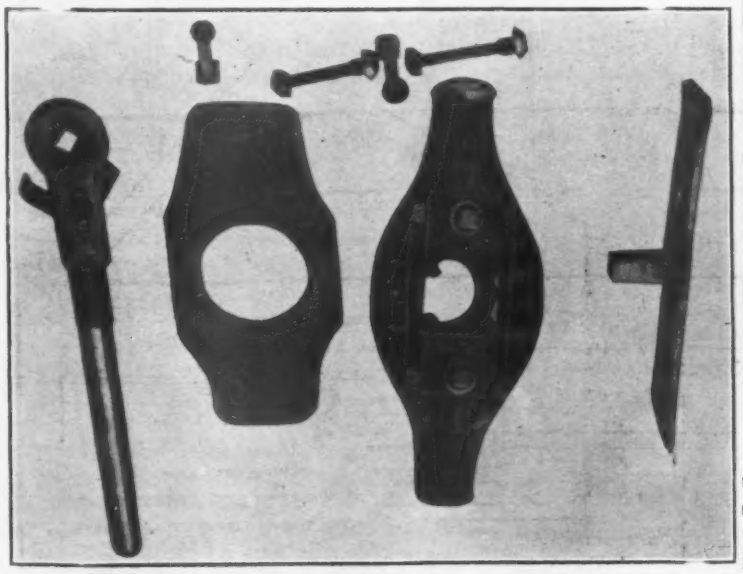
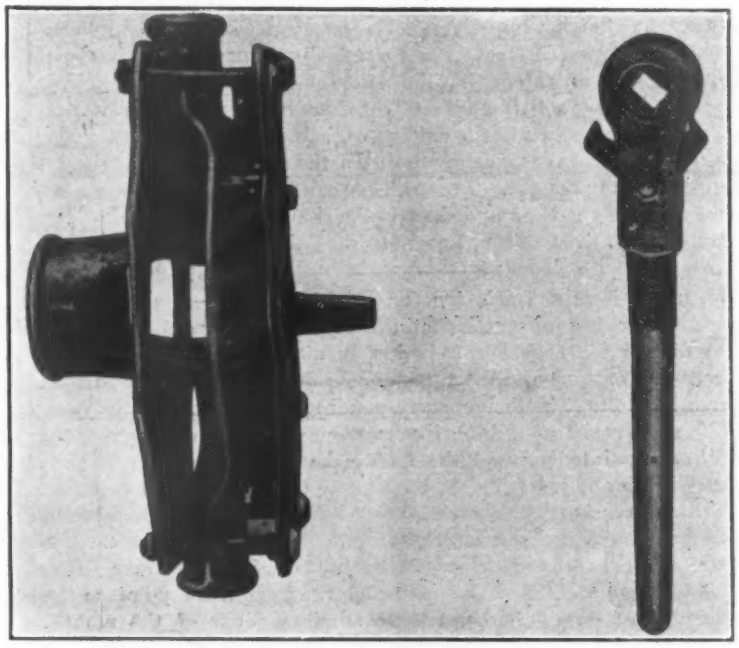
*No. 8. Handy Method of Keeping Meter Shop Daily Stock Record.*—An ordinary blackboard about 4 feet long by 3 feet wide, and ruled as per the attached sketch, is used for this purpose.

The meters, according to sizes, received at and delivered from the meter repair shop are added to or subtracted from, as the case may be the number on hand at the beginning of each business day, thus showing at a glance what meters are in the meter repair shop for repairs. A similar count is kept of the meters in the meter shop, showing the number of meters of each size which are available for immediate use.—W. J. DORR, Los Angeles, Cal.



**Wrinkle No. 7.**



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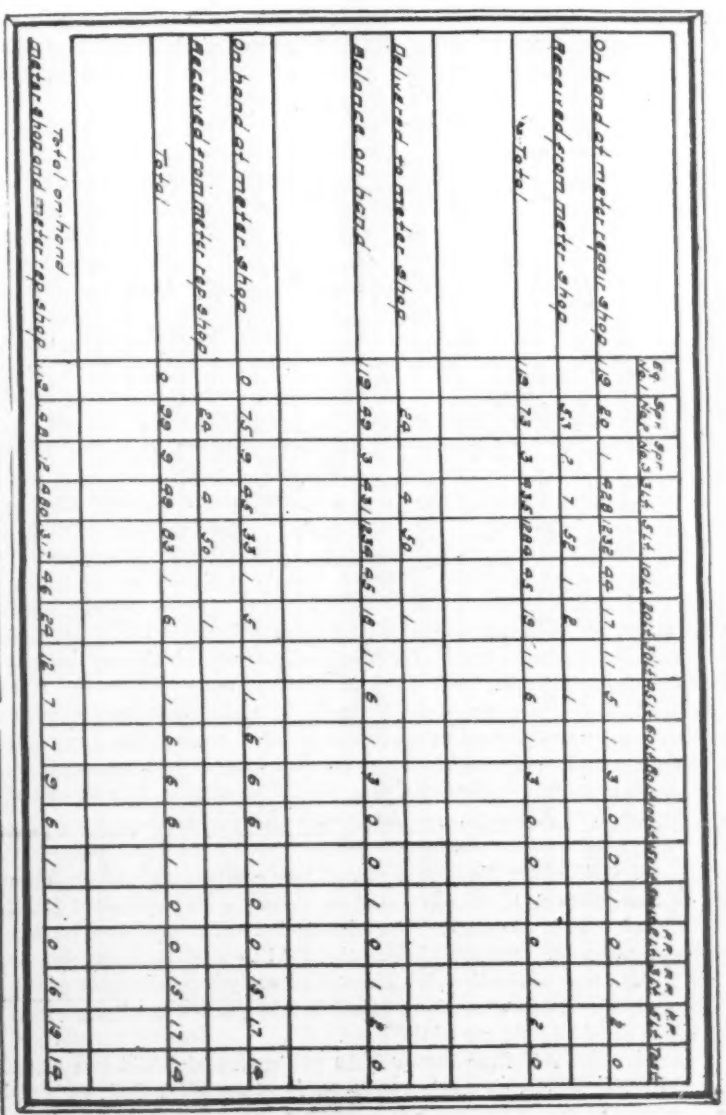
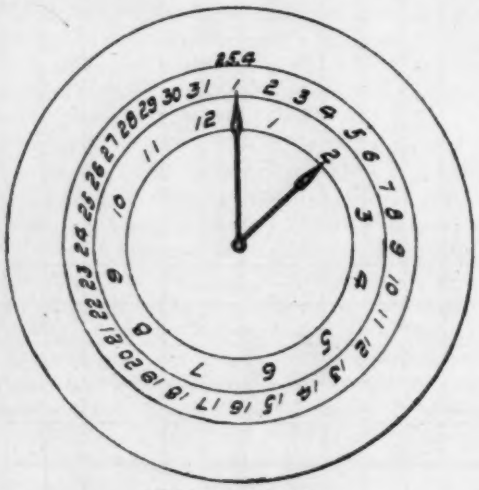



**Wrinkle No. 8.**

*No. 9. To Prevent Exhauster Blades Sticking.*—In oil gas manufacture the exhauster impellers or blades become sticky, owing to the dryness of oil gas; in fact, if not watched very carefully, they will gum up to such an extent that the machine cannot be operated. We have found a very satisfactory method of preventing this, by injecting at four different points in the exhauster ordinary fuel distillate under pressure. This has a tendency to soften the pitchy material without any detriment to the gas. The distillate can be applied with economy by means of a small pump belted to the shaft or coupling link of the exhauster.—F. C. MILLARD, Los Angeles, Cal.

*No. 10. A Record Indicator for Purifier Boxes.*—A simple little device for keeping tab on the condition of purifier boxes is as follows: A tin disk or dial, say 8 to 10 inches in diameter, is painted with 3 concentric bands around the outside. On the inner band are painted figures from 1 to 12 inclusive, corresponding to the months of the year, and figures from 1 to 31 inclusive, corresponding to the days of the month, are painted around the middle band. The outside band is painted black and is left blank, the surface being made so that it may be written upon with crayon. Two hands, similar to the hands of a clock, are attached to the center of the disk by a thumbscrew. The shorter of the two hands points to the numbers on the inner band, which indicate months of the year, and the long hand points to the numbers on the middle band which indicate days of the month. When a purifier box is "cut in" service the hands of the dial are placed so as to indicate the date—month and day. The condition of the oxide in the box is determined by a test made by the works' chemist, and the percentage of sulphur in the oxide as shown by this test is written with crayon or white chalk on the outer band of the dial. When a box is "cut out" of service the hands of the dial are



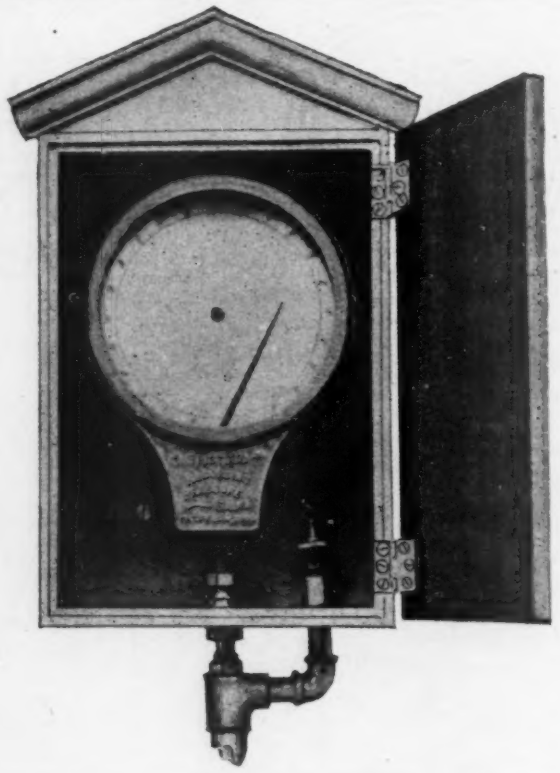
Wrinkle No. 10.

changed to indicate that date, and a little tin sign marked "Out" is hung on the thumbscrew. With an indicator for each purifier box it is a simple matter to keep track of a large number of boxes. The condition of any box is instantly shown by a glance at the dial; the indicators are easily read by the chief purifier man or the foreman; and their use obviates the necessity of consulting a written record in the office in order to ascertain the condition of any box or set of purifiers.—F. C. MILLARD, Los Angeles, Cal.

*No. 11. Method for Testing Lime.*—Place one gramme of the lime to be tested into an ammonia distillation flask with 3 grams of C. P. $NH_4Cl$ and 300 cc. of water. The mixture is then to be boiled for exactly 20 minutes. The $NH_3$ being absorbed in a normal solution of $H_2SO_4$, the value of the lime is estimated directly by the weight of the $NH_3$ distilled. The value of pure CaO is taken at 100 per cent. This gives the alkalinity factor of the lime.

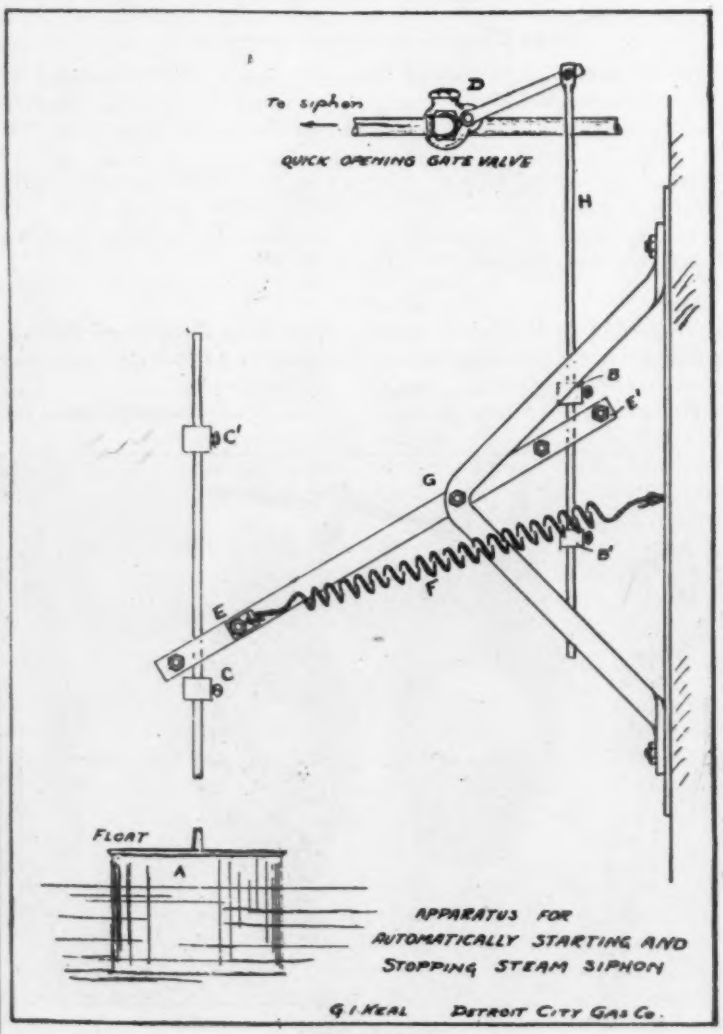
For example: A's lime shows 92.80 per cent. and B's shows 94.50 per cent. Of course, this does not mean 94.50 per cent. CaO, as MgO is also present and is of higher alkalinity value per unit weight than the CaO. And as the unburned lime has some value, it would, therefore, be possible to get a lime equivalent to over 100 per cent., if it were low enough in silica and high enough in magnesium.—F. E. PARKS, Detroit, Mich.

*No. 12. Gauge Station Box.*—The accompanying photograph shows a tight, cast iron box designed to hold a recording pressure gauge and to be fastened to any convenient post or pole. A 1-inch service pipe



Wrinkle No. 12.

runs from the main to the bottom of the box to supply pressure to the gauge. These gauge stations are located in the outlying and low pressure portions of the city and charts taken from them every day, furnishing data for pressure control.—F. L. CROSS, Detroit, Mich.




Wrinkle No. 13.

*No. 13. Apparatus for Automatic Control of Steam Siphon.*—The object of this apparatus is to automatically control the steam valve on a siphon or pump. *A* is a galvanized iron float which, as the water rises, forces lever *E E*¹ to a horizontal position. When lever *E E*¹ has passed the point of greatest tension of spring *F*, the end *E* flies upward, *E*¹ striking stop *B*¹ on valve rod *H*, and opens valve *D*. The siphon then starts to work, float *A* sinks with water level, and the operation is reversed, valve *D* closing when stop *C*¹ on float rod forces lever *E E*¹ past the horizontal position.—G. I. KEAL, Detroit, Mich.

[To be Continued.]

## A Few Thoughts on the Advertising of a Public Service Corporation.

[An address by MR. E. ST. ELMO LEWIS, at the Kalamazoo Meeting of the Michigan Gas Association.]

I don't know whether I can observe Josh Billings' dictum: "Say as much as you like; but say it in a few words," but there may be something worth while in what I have to say. You may be interested in an outsider's view of some of the problems of advertising a public service corporation.

As a newspaper and magazine editor, as one who has championed the use of advertising space by the political parties, as one who believes that corporations have not received fair treatment because they have not been open and candid with a public whose impulse is to be fair, I venture to ask your indulgence, at the request of your committee.

In the first place you are confronted with a public suffering from much misinformation, and you are charged with the failure of all your predecessors. The mere mention of public service corporation in the minds of the people is synonymous with private office intrigues, and on-the-quiet-compacts with more or less immaculate public servants. The people think the worst because you have not told them the best.

I am contradicted by a manager who says, "We have told them the truth—a hundred times; but they won't pay any attention to it." Then I'll tell you that you have not told them so they could understand it. You have not "reached" the people. I think I can prove it. You may be as innocent of wrong doing as the babe yet to see the day; but that makes no difference. The people have you ticketed and filed away as one who will bear watching. All of which is your fault.

Corporations are like men. We will not forget that ancient and motheaten jest, "Corporations have no souls," because we know they have minds and bodies. The idea that corporations are judged by different standards and ideals from men is all tommyrot. As long as the making-and-selling of gas is not a mechanical process, regulated in dealings with the people by a time-clock and cash register only, as long as people must have men they can trust, as long as you have people you must trust, we are going to have people, men, everyday men, play a large part in public service corporation work, and these men will furnish the character that will make or break a corporation. The people do not take to abstractions. They do not make fine distinctions between corporate and personal liability and treatment. Tbey select out of a corporation some one man who must stand for all the corporate sins of omission and commission. Standard Oil will always mean John D. Rockefeller, the Detroit Gas Company, Mr. Butterworth, in the minds of the greater and lesser publics.

Doubt that? Go into your own ward, your own precinct. Ask the men who own homes and pay gas bills and you will be surprised at the knowledge these men will show of the people who are in your Company and responsible for its management. I have seen public service corporation officials shocked dumb by some new realization of public hostility. "Where in the name of all that's holy do the people get such fool ideas about the profits in the gas business?" "From your silence," was the answer; but the gas official thought that was repartee. Just because this thought in the public mind does not find expression in action, just because the venal politician is returned to office, just because the blundering corporation is not brought to book, just because the people do not do something, is no indication that the people do not think, observe and resolve some things.

The sense of the mass of people is slow to arouse to action, but when it thoroughly grasps the extent of a real or a fancied injury we have but to consider the Armstrong insurance investigation and its results, the railroad cases, certain incidents in the gas history of New York, and the activities of President Roosevelt, to comprehend what the people may do, and how far they may go.

I have no more sympathy with the radicalism of senseless iconoclasm, which is so easy to stir into life and so difficult to control, than the most rabid believer in the doctrine that some men were born to have and some born to give; some to rule and some to be ruled. But I believe in recognizing conditions in this country, and I believe it is one of the most dangerous and purblind of doctrines to hold that any corporation can, in the long run, be friendly only with the *representatives* of the people and not with the people themselves. Any political machine, whether it be Tammany of New York or the Unions of San Francisco, represents but the active *minority of the total electorate*. While we know that a cohesive and well-managed minority generally rules, yet the vital necessity is always present to have the majority on our side.

The elemental fact is always present, that two men are always better than one, and we have but to read Carlyle's "French Revolution," a history of Cromwell's time, and some of the mob history of more recent days, to give pause to cynical talk about the people being sheep. Consider for a moment the first Bryan-McKinley campaign, in which the silver heresy had us all scared into Republicanism. It cost us millions of cold cash to fight that battle, yet for 10 years we had been warned time-and-again. That campaign shook the banks out of their cold storage attitude towards the use of printer's ink, and to-day thousands of banks are profiting by that experience and getting new deposits, creating wealth, because they are calling into circulation the dead money heretofore hidden into the stocking, the parlor stove or the old teapot. They are teaching the people to save, to trust the banks. The banks paid dearly for that half century of negligence.

Socialism is going to poll a vote this year that will make some of us old party men rub our eyes. Socialism has been busy. While we have been lobbying bills to protect our present interests, socialism has been making the workingman read what it had to offer; while we have been dealing with the *few*, socialism has gone to the many.

The politicians have commenced to realize the value of printer's ink in a different way. The October magazines contain a 4-page advertisement from the Republican Committee, and some of the weeklies have already carried these advertisements. These should be pointers to the thinking and observing man, who has before him the semi-political questions involved in making money for a public service corporation.

These few thoughts have much more to do with my subject than may appear on the surface. Any policy that calls for making a confidant of the public may seem to many of you gentlemen as a foolish waste of time, money and effort, and fruitful of misunderstanding and painful anxiety. Could there be greater anxiety than you have sometimes suffered, greater misunderstandings than those which to-day mar your relationships in many sections? The biggest coward in the world is the man who holds office by virtue of his organization. The next biggest coward in the world is the newspaper proprietor when afraid of his circulation and advertising. Having dealt with both kinds, I know what I am talking about. The one is afraid of policies, principles and education, and so is the other. Dealing with either with a view to permanent peace is but whistling against the wind.

Make your peace with the people and you can make a venal politician eat out of your hand, and a dishonest newspaper editor jump through a hoop. It is obvious that no corporation having the confidence and the support of the people can be rendered unsafe in its tenure of franchise or unprofitable in the exercise of its business.

It is the question, "How can we get the confidence and support of the public?" that immediately concerns us. I offer an apparently simple, yet really difficult, remedy—education. Show it what it is getting for the money. The people are eager to learn, and they investigate and learn all the time. They gain impressions and knowledge. They may learn little that is true or right; but they learn something. It is regrettable that one of your own people can find it in his experience to say:

"The public or their representatives have very little conception of the business of manufacturing, distributing and selling gas; they have little or no idea as to what is being done each hour of the day and each day of the year by the managers to furnish an uninterrupted and uniform service at rates that are exceedingly reasonable and fair." I quote the foregoing from the address of an ex-President of the American Gas Light Association, Mr. E. G. Pratt.

Where are the people to go for the better "conception of the business of manufacturing, distributing and selling gas?" Where are they to go to get the proper "Idea of what is being done?" etc. Shall

they not go to the gas company? What do the people know about the physical value of properties? The actual cost of manufacture? The cost of distribution? Depreciation of plant and equipment? Cost of injuries and damages? The real truth about the operation of meters? What do the people actually know about the many tangible and intangible things that constitute the "service" for which they pay, when they think they are only getting so many cubic feet of a commodity? The public ignorance of these things may pass your belief, yet it is a stubborn and dangerous fact. Do not leave this whole subject rest until the politician commences to agitate; do your educating all the time, and you cannot then be put on the defensive when the municipal ownership idea strikes the town. It is up to you to teach the people the things they should know. You know what they learn from prejudiced and colored sources; teach them the right thing. The people fear the thing they do not understand, and they believe the worst of the power they do not comprehend. For this reason the half-truths of agitators and demagogues are the most dangerous to you and your interests.

To meet these requires more than the 'prenticc hand of some reporter who can perhaps write with facility about a subject of which he knows absolutely nothing. The man who must meet the problems is the man who knows your business and its relations to the people and at the same time understands their attitude towards your business. There's more distinction between these two things than will first appear to the casual observer.

The first thing any advertiser needs is a personality. Personality—individuality—is the power that counts in advertising. Most advertising is as much like all advertising as one maltese kitten is like another, which fact makes a market for tabby cats, boardyard cats and just plain cats. You like men who do things. Have character, with a few rough spots, and a corner that doesn't crumble into smooth roundness when it rubs up against the world.

That is personality—which puts a brand on a man, so men may know what he will do, how he will do it, and frequently, when. That means you know "where you can put your fingers on him."

Now it doesn't much matter what kind of a man he may be with respect to his morals, public or private, but the world has greater confidence in the man of known personality. It is that very force of personality which made Croker hard to beat in New York, Durham in Philadelphia, and makes Roosevelt a power. Take Lawson. No matter what you may think of him or his methods, you must admit the power of his personality. He may be insincere, he may be all that's wicked and detestable, but he has a following. It is the same with Johnson, of Cleveland, with Bryan; and now Mr. Rockefeller, recognizing this, and making an opportunity of persecution, has been smoked out of his speechlessness. If he realizes this opportunity he can give himself an entirely new character in the eyes of many people.

For that reason I believe every advertisement of a public service corporation should be signed by the manager, president or other official who stands for its policy in the eyes of the public. I see you exchange glances at that (and figuratively throw up your hands), but you'll have to revise many of your ideas on his question. You have to forget your conclusions on dignity and modesty. Dignity that is unsuccessful is a contradiction in terms; and as for modesty—well, "It was a great day for fools when modesty was made a virtue."

I would have every advertisement signed by one officer of the company, and I would use a facsimile of his signature at the end of it. Why? Because people want to talk to a person, not to a sexless, nebulous, corporate name, that stands mute and senseless between them and the man whom these people want to hear and see and know. I would make the "ads." a little more careful in phrasing, in promises and claims, all of which wouldn't hurt gas advertising a bit. So much for the fundamental principles governing all advertising. The selling of gas is a commercial proposition. Ten years ago gas officials laughed the advertising man out of their offices. Electricity, having a public to educate, choked that laugh in their throats, and gas companies are realizing that selling gas is a good deal like selling anything else. They are realizing that they can educate the people to use more gas, just as the bankers who thought they had all the money found out that they had only the money of those who knew what a bank was. Advertising has sold more gas to the same number of people than could have been sold without it.

What are you selling? Gas. Well, what for? Tell the people.

Many companies are doing this. Some of the advertising from the consumer's standpoint is futile, and the selling policy from the standpoint of the progress of selling methods in other lines primitive. Don't excuse the present failure on the ground that the gas business is "different." We heard that in 1898, and every year since, and it has been urged against every innovation in every business since the time Adam went into the fruit business. Yet we see the new methods coming into greater use every day. Gas advertising is of two kinds—money saving and service talks. The money saving gas advertising can be modeled largely on th expert product of the low priced department store. If it is a new mantle at a cut price, show the mantle, tell what it will do, put in the old price and the new one; the first in small figures, the last in bold-face, large figures. Write it in words your office boy can read aloud to you and give you an intelligent idea of what you mean. Then there are service talks, which should be directed at the home, the factory and the semi-public institutions. These talks are hard to write, and they call for all the concentrated experience of a man who knows human nature and the mechanical processes of publicity. Most of such talks are as dead as last year's roses, which condition is due principally to the fact that the writing of advertising is one of the bedamned duties of the day, for some overworked official or employee who has no other claim on the job than that he looks after the commercial sales, and hasn't enough of an appropriation to hire competent help.

Hardly any of it is satisfactory to the man who did it, but they have to use space in the newspapers, and they fill the space with what they can at short notice, and then try to forget it. They put me in mind of the Irishman another tells about, who put a sovereign on the plate at Mass, thinking it was a shilling. "Mike," who was with "Pat," suggested they explain to the priest and get the money back. Pat agreed, but finally backed up, saying: "I gave it to Heaven; now to hell wid it." The gas manager sees other advertisers using space, and he considers his advertising contribution in much the same way as "Pat." I am not going to tell you how to write your advertising. In the first place I do not believe in the patent medicine, cure-all attitude; in the second place, I believe you are too wise to swallow such a dose.

Most good advertising comes from the men who sell the goods, because they are the sources of information to the people, and from the people. The company with which I am associated has 300 salesmen on the road, scattered from Hudson Bay to Patagonia; from one ocean to the other. Seventy-five per cent. of these men come to our factory at least once a year. I try to get out in the field as often as I may, to see others and get a line on local conditions. There is not an argument why our product should be used in your offices or those of the 390 other lines of business to which we sell adding machines, that does not come from those men in the field, given me hot out of the crucible of their everyday experience, to be clarified and adapted to the needs of classes instead of individuals. Whatever success has come to us through our advertising has been entirely due to the fact that we could reflect the actual successful selling arguments, the daily experiences and sales-making ideas, in the printed matter we have distributed.

There is another point of contact between the advertising and selling. The advertising that will interest madame who considers your claim on her consideration from an artistic standpoint, will not appeal to Mike's wife who wants to add to the hoard in the savings bank or the old tea caddy.

Advertising must reflect these differences. The advertising will fail to create business in very notable proportions:

a. If your old users are not in line.
b. If the local papers are not in line.
c. If the people are not friendly.

Your old users may be suffering from the lax discipline of your office force. If there is any one thing that injures the public service corporation it is the absolutely idiotic policy of permitting employees to manhandle the public. When we realize the force of the fact that every mistreated customer is a liability and every pleased user an asset, we will be more careful to select clerks aud department heads who can furnish information cheerfully and clearly. That last is most important, for of all examples of intellectual chaos finding expression I think, next to getting an explanation of freight classifications and rates from a freight agent, hearing the average gas office man explaining why your meter reading must be correct if the inspector says it is, is the most enjoyable. An advertising campaign to be successful must have these departments in harmony to insure its success:

1. Advertising—which creates possible customers.
2. Sales—which makes customers.
3. Office—which keeps customers.

There must be co-operation and harmony among these at every step of the progress in a campaign of education.

These departments must be keyed up to the pitch of getting and keeping more business. Make your office people understand that the company may have a copper rivetted cinch, but *they* haven't. Make them understand that you are paying good money to find out what people want; that you are paying more good money to get their names on the books; and that you won't permit any employee to jeopardize that investment by inattention or discourtesy. I have lived in 9 cities in 18 years and have been a more or less frequent visitor in 80 other cities, and I remember but few cases where the office force of the public service corporation was not a constant menace to the goodwill the company was endeavoring to create.

Some managers should visit Marshall Field's training school for salesmen, or Wanamaker's, and learn how the saleswoman and man are trained to meet and gain the public confidence.

The next consideration is the sales force. In the smaller centers the selling force in sometimes a single individual, again he may be entirely negligible. Whenever you have a salesman train him to approach your customer, and to sell and to demonstrate. The policy of hiring men, and then leaving them to work out their own salvation, is a process expensive, primitive and only casually successful. In any campaign for more business the advertising is intended to create a state of mind favorable to the company and its product, and this must be cashed in by the solicitor or canvasser when he calls. The company creating a demand for the side lines of stoves, heaters, etc., must have a selling force—1 or 20 men as the case may be. Teach these men how to sell.

If you are employing canvassers to sell gas mantles, make them know what they are selling. Teach them salesmanship. Get them together and let them tell the stories of their experiences.

Lots of valuable experience, sales making arguments and methods are going to waste when but 1 man in 20 has them. A salesman selling a house-to-house specialty got up in a little meeting one day in answer to the simple question: "How do you get past the screen door?"

After several men had described as many more or less successful methods of getting the woman to open the doer, he said:

"I go to the door and knock; then I step to one side and look up the street with my back to the door, but close to the house wall. The housewife comes to the door, sees no one, opens the door to look out; I step back in the opening, make my approach and the trick is done." Now that one little thing was worth thousands of dollars to his company, because it solved an everyday problem that had been baffling some of the best men who had been compelled to talk through the screen door and could not get a chance to demonstrate. These little weekly meetings of the canvassers can best be regulated by the men themselves, by letting them tell what they had done, how they got certain lines of business started, etc. The interchange of opinions and ideas will be valuable to them and to you. In our own company we hold selling conventions in almost every sales agency every Saturday afternoon, for the purpose of bringing out new ideas and keeping everyone in touch with the progress of the work in the field.

What arguments sell goods in certain lines of business? What particular machine is most useful in certain businesses? What method was found most successful in gaining attention in a certain house where the conditions were thus and so? A stenographer takes notes. The resulting experiences, arguments, ideas, systems, methods are invaluable ammunition to all, and these meetings are a constant source of inspiration and profit. The standard arguments are, of course, embodied in a sales manual, with which all our new salesmen are equipped. There are standard descriptions and demonstrations of our machines, which we have found necessary because some salesmen could not explain coherently and intelligently what the machine could do or how it could do it. After recently hearing a canvasser describe the advantages of a new gas burner to my wife, I felt like suggesting the standard demonstration idea to his employer. Such drilling strengthens the strong man and frequently makes the weak salesman a reasonably successful one.

The advertising has taken care of the possible customer in the territory. Teach the people something about meter reading, unless you don't think it advisable, in which case they will find out the wrong thing for themselves, at your cost. Give a talk on "Why Gas Bills are Big;" a little pamphlet, and sign it with the General Manager's name, so he'll have to stand for it. Your by-products should come in for special treatment in the same way. Invite complaints, as though you expected them and wanted to hear them.

Confidence is what you want, and you won't get it by talking about service that you do not give. Every complaint remedied is another rivet in your cinch. Pick your complaint clerk as you would a horse or automobile for service. Circularize your list when you have some special thing to offer; make opportunities to talk to your people in a man-to-man way. Don t look on your newspaper advertising as space taken to keep the newspaper "in line." Use it because you want to tell the people what you know the people should know. I never knew a paper to get after a company the people believed in, and if the company deserved criticism I never knew the buying of a few columns of space to shut up a paper whose criticism would hurt. I heard a gas man say once that he believed in big type and prices; cut out the talk. So do I, when it comes to his kind of talk.

If you have something to say and will say it, to attract, interest and persuade, people will read it. Some "ads." are not so long as they seem. Others are so interesting and suggestive that it doesn't matter how long they are. Wanamaker has built up his business on page display; any woman will read how she can cut down a gas bill, and she won't think of the length. There is no syndicated advertising that can do half what you ought to be able to do. Any man who comes to you with a patented, guaranteed-not-to-ravel plan of advertising that didn't grow out of a careful, painstaking study of your local conditions and what your company could do and do well, takes you for a fool and should be treated accordingly. Any plan of advertising, any copy worth paying for, must grow out of the business as a result of the intelligent application of first principles of successful advertising. Too many gas advertisements are written to the manager of the commercial gas department, and not to the possible customer. I'd probably forget all about the sales manager, unless he had been an advertising man who had made good.

I'd find out what he had to sell, the kind of people he had to sell to. I'd sit at the complaint desk for a week or so, and go out with the canvassers now and then, then I'd go to the people. To actually sell the gas is the sales manager's job; to find people to sell it to is the advertising man's.

People are more interested in people than in things, which is to say, people want to know about you and your satisfied customers, and who and what and where they are. They don't care anything about how much brass there is in a burner. That is what we call human nature. Probably you have recognized it. Once in a while it is well for the official to have an interview in the newspapers on some subject of local interest. If times are getting better, be quoted on the subject and tell what the signs are in the gas business. When you add new equipment talk about it, leaving an impression of the large capital it requires to keep up your service; but show what that new equipment means in service to the public. Don't give bald figures; but translate them into things of everyday knowledge. A million cubic feet doesn't mean anything to the man in the street. Tell him it will fill the city hall with nothing else inside, and he understands. Look out for the gum shoe publicity scheme, which offers canned interviews on everything, from wicked municipal ownership schemes to the latest development in gas economies. The articles prepared by experts in the preparation of articles for the public consumption, are good, but what sense is there in endeavoring to slip them in to the publications in the guise of "readers?" Play the game above the board, gentlemen; the other way doesn't pay. One word about the political work done in the advertising columns by some public service corporations. Most of it has been clear over the heads of the people—most of it has been written in the third person, and nobody stood for it. As I heard a neighbor of mine say of some advertising being done by a company during a franchise fight. "All that hot air and not a man among 'em had sand enough to stand for it."

In the last analysis the copy must be addressed to the great mass of the people, illustrated by homely comparisons from their everyday lives, and talk to them in your everyday personality. Your advertising manager, if you afford such a luxury, of course, will keep in touch with all the civic bodies and have your civic importance properly reflected in the news columns. He is your mouthpiece. Cut out the childish special editions of the local papers, give them some space all the time. Cut out the write-ups, the programmes, and all fly-by-night schemes. Put your advertising on a business basis. Go to the people, fairly and squarely; educate them. The only thing a public service corporation conducting a fair and square business in a square manner, has to fear, is not the venal official, the corrupt newspapers, but the people whom it has kept in ignorance of its true purpose and mission in the community.

# Correspondence.

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

### As to Experiments in Artificial Respiration.

NASSAU AND SUFFOLK LIGHTING CO.,
FREEPORT, N. Y., Oct. 26, 1908.

To the Editors AMERICAN GAS LIGHT JOURNAL: I send you herewith clippings from a recent issue of "Collier's" of an article entitled "Why We Drown," in which Woods Hutchinson, A.M., M.D., calls attention to the investigations of an English Commission and their experiments and conclusions in the instance of artificial respiration. You will note his remarks respecting the Sylvester and the Howard methods respectively, which are those we have been taught to use. I think that their conclusions should be brought to the at-

tention of gas men, and know you will be glad to put the matter before them. Very truly yours, S. L. CAMPBELL.

We are indebted to Mr. Campbell for his thoughtfulenss in calling our intention to Dr. Hutchinson's briefs in this respect, especially in view of the criticisms that have been made frequently of late over the generally accepted plan in and around gas plants of restoring respiration to workmen overcome by gas. Dr. Hutchinson writes:

One of the oldest and most painfully familiar facts of human history is that we drown whenever we fall into the water and sink. And the explanation of this distressing result is equally ancient and familiar; we die because our lungs fill up with water. So obvious and self-evident was this explanation that, like so many other universally accepted and self-evident things, it was never, until lately, put to an accurate, scientific test. The not unusual result of the test was to show that the ancient explanation is almost entirely wrong.

A few years ago a scientific commission was appointed by the English Government, headed by Professor Schaefer, of Edinburgh, for the purpose of determining the best method of resuscitating those apparently drowned. The first thing that confronted this body was the fact that we were entirely ignorant as to exactly how death by drowning was caused. The commission proceeded to determine this fact.

A thorough and elaborate series of experiments on animals were carried out, with some distinctly interesting and valuable results. First of all, it was found that death by drowning is not due to the filling of the air passages with water, as many of the animals experimented on were found, upon examination immediately after death, to have drawn into their lungs water in amounts ranging from 4 to 8 ounces only (from one-third of a cupful to a cupful). In some instances, death occurred when only 2 ounces of water had been drawn into the lungs.

The chief cause of death appeared first to be a curious inhibiting or paralyzing effect upon the heart. This was quite apart from the direct effect upon respiration, so much so that it could actually be prevented by administering a drug (atropin), which stimulated the heart, and prevented the transmission of this curious reflex paralyzing effect. As Professor Schaefer dryly remarked:

"If you are quite sure you are going to be drowned, it is a good thing to take a dose of atropin in advance."

The second chief cause of death appeared to be a profuse pouring out of mucus, which occurred from the throat, windpipe, and lining of the bronchial tubes. This, by the violent efforts at inspiration, rapidly becomes churned into a froth, plugs up the smaller air tubes and air cells, and renders it almost impossible to get air into the deeper parts of the lungs. This accounts for those puzzling cases in which individuals were got out of the water in a very few seconds after breathing had ceased and yet ultimately died, in spite of everything that could be done to resuscitate them. They were literally choked by their own secretions, drowned in their own mucus. Even the small amounts of water taken into the lungs were found to either be coughed out again directly, as soon as the passages were cleared, or to be promptly absorbed into the blood vessels.

This gives us the important practical knowledge that there is no need to waste any time in standing the victim on his head, or rolling over a barrel, or shaking him, head downward, in order to "get the water out of his lungs." Such procedures are a sheer waste of invaluable time.

Next, experiments were made as to effective methods of performing artificial breathing, and it was soon found that these were of such a character that they could be carried on upon a living human subject. Volunteers were found who would put themselves in the hands of the experimenters, draw three or four full breaths, then completely relax and make no effort at breathing while the experiment was carried on. A tube connecting with a spirometer was placed in the mouth, and then the various standard methods of producing artificial respiration were tried upon them, and the actual amount of air which could be forced in and out of the lungs carefully measured for the first time in the world's history.

It was found that out of the three generally accepted methods of artificial respiration, the so-called Marshall Hall, the Sylvester and the Howard, the first two were utterly inadequate and the third dangerous. By no possible vigor and skill at manipulation could the volunteer subject have enough breath pumped in and out of his lungs by either the Marshall Hall (which consists of rolling the body from the side over on to the stomach and back again in rapid succession) or the Sylvester (the well known pulling the arms up over the head and then pressing down firmly again on the chest) to keep him in any degree comfortable. The Howard method, which consists of compressing the sides of the chest with both hands at regular intervals, allowing it time to expand, while it would effect a nearly sufficient interchange of air, was found to be fraught with some danger to both the ribs and the liver, on account of the force necessary to be used, while from the fact that the patient lies upon his back the tongue is almost certain to fall back and produce suffocation; or such fluid, water and mucus as may be present in the throat will accumulate there and prevent the entrance of air.

After many trials a method was hit upon which avoids all the dangers of the old methods and is so strikingly effective that perfectly healthy individuals submitting themselves to it can be kept comfortable for not merely minutes but hours at a time, without having to make the slightest voluntary effort of their own at breathing. Indeed, Professor Zunst, who eagerly submitted himself as a subject for demonstration at the last Congress of German Physiologists, denounced, with mock solemnity, the use of the method as subversive of good morals, because it makes it possible for the individual who is literally "too lazy to breathe" to go on living. The method, fortunately, is simplicity itself, and very easily carried out.

The individual whom it is desired to resuscitate is promptly, and without a moment's delay in either loosening clothing, drying, warming, or shaking the water out of the lungs, turned upon his stomach upon the shore, or other level place, the face being turned to one side so that the nose and mouth are clear of the ground. Then the operator kneels, either by the side of or astride of the patient's hips, facing toward his head, places both outspread hands upon the small of the back, just over the shortest ribs, and pitches his body and shoulders forward so as to bring the whole weight heavily upon the body of the victim. This downward pressure should take about 3 seconds. He then swings upward, lifting his hands off suddenly and quickly. The elasticity of the ribs and of the contents of the abdomen cause the chest to expand. In 3 seconds more the process is repeated, and so on, indefinitely, making 10 or 12 of these movements per minute. The position allows the tongue to fall forward, and any mucus or water which may be present in the lungs to readily escape through the mouth. By simply swinging backward and forward, throwing the weight of his body upon the waist line of the victim, any operator of modern intelligence and of most moderate strength, even a delicate woman or a child, can gain a sufficient inflow of air, flowing in and out through the lungs of the patient, to supply him with as much air as would be taken in if he were able to breathe voluntarily. Promptness in beginning the pumping operation is imperative. Professor Schaefer's experiments proved that conclusively.

This method, which has only recently been thoroughly worked out, has been adopted by the Royal Humane Society of England, the Royal Life Saving Society, and the Coastguard Service.

## Items of Interest
### FROM VARIOUS LOCALITIES.

LUCIAN T. F. TULL, formerly in the auditing division of the New Amsterdam Gas Company, New York city, has been indicted by a Detroit federal grand jury on the charge of passing counterfeit money.

THE Messrs. Dawes Brothers have filed letters in Portland, Me., for the creation of a business venture to be known as "Dawes Brothers, Incorporated." Its capital is fixed at $10,000,000, and its officers are: President, Clarence E. Eaton; Treasurer, T. L. Croteau, both of Portland. The avowed purpose is the "Producing and distributing of gas," etc.

AT the annual meeting of the shareholders in the Troy (N. Y.) Gas Company, the Trustees elected were: A. B. Banks, Jas. A. Eddy, R. C. Pruyn, A. E. Bonesteel, Edward Murphy, Jr., A. N. Brady, F. J. Malloy, Thos. Breslin, Peter McCarthy, C. E. Davenport, Alva M. Ide, T. E. Draper and J. W. Fleming. Mr. Eddy was elected to the vacancy occasioned by the death of Mr. William Kemp.

AT the last meeting of the Parsons (Kas.) City, the matter of granting a franchise for the operation of a gas works in that city was continued.

IN the settlement of its royalties with the city of Philadelphia, on gas sales, for the quarter ended September 30, 1908, the United Gas Improvement Company handed a check to the authorities in the sum of $254,018. The 15 cents per 1,000 cubic feet royalty went into effect during this quarter in part and the percentage or quantity division in the payment was this: 10 cents per 1,000 on a sale of 2,926,510,000 cubic feet, and 15 cents on a sale of 1,692,038,028 cubic feet. For the corresponding period of 1907 the royalties amounted to $171,962.

THE proprietors of the Board of Directors of the Consumers Gas and Fuel Company, of Atlantic City, N. J., have awarded to Messrs. R. D. Wood & Co. the contract for the construction of a storage holder up to retaining 1,000,000 cubic feet. We understand the contract calls for its completion by April 1 next.

THE offices of the American Gas and Electric Company have been removed to New York, and the Company is now located in the Terminal Building. Philadelphia was the Company's former mailing address.

THE Colonial Hill Improvement League, of Dallas, Tex., has asked that gas arc lamps be substituted for the electric lamps now employed for lighting the streets in the territory controlled by it.

THE controllers of the Atlantic (Ia.) Gas and Fuel Company have awarded the contract for the water gas sets to the Western Gas Construction Company. The holder (a vessel of 30,000 cubic feet capacity) went to the Stacey Manufacturing Company.

"V. M. T.," writing from Spencer, Mass., under date of the 25th inst., says: "Mr. F. A. Barr, who has acted as Superintendent of the gas works here for quite a lengthy period, has resigned. His successor is Mr. F. E. Schroeder, who for some weeks has been in Spencer as the personal representative of President Alfred Clark. Mr. Schroeder at one time was Consulting Engineer for the Massachusetts Lighting Companies."

"D. M.," writing from Baltimore recently, said: "Everybody may not like all the methods of Mr. Charles M. Cohn, Secretary of the Consolidated Gas, Electric Light and Power Company, but from the point of view of many he keeps a right good look out for pleasing the Company's customers. For instance, the Pikesville district or section of Baltimore is a long hark to the Company's office, and some complaint was made respecting the length of the journey. Secretary Cohn investigated the situation personally and, as the result of two or three visits to the locality and an interview with Mr. Paul A. Segar, President of the Pikesville National Bank, an arrangement was made whereby hereafter the Bank will act as collector or receiver of gas accounts in the division noted."

THE proprietors of the Carlisle (Pa.) Water and Gas Company, at the annual meeting recently held, decided upon expending a good sum in plant betterments. These are to include a gasholder up to retaining 150,000 cubic feet and an important plan of main extension. In its electric division the Company will also make many changes.

MR. T. N. CASE, of the engineering division of the Kerr Murray Manufacturing Company's forces, delivered an interesting lecture on "The Manufacture of Artificial Gas," before a large audience in the hall of the Electro Technic Club, Fort Wayne, Ind., the evening of October 20th. Mr. Case illustrated his speech by means of models, etc.

THE recently organized Saunemin (Ills.) Gas Company has secured its charter and a site for its works has been purchased. Mr. A. Frost, of Saunemin, can likely furnish details regarding the Company.

MR. CHARLES W. PRICE informs us that the *Electrical Review* has purchased the *Western Electrician*, and that the title of the succeeding publication will be the *Electrical Review and Western Electrician*, the initial issue of which will be on sale the 7th inst. The publishing offices will be in the Marquette Building, Chicago, and the present offices in this city, at 13 Park Row, will be maintained. The "dress" of the publication will be that heretofore used in printing the *Electrical Review*. Good luck to President Price and his men.

THE Texas and Indiana interests that own the gas plant at Temple, Tex. (this plant was put out of commission by fire something like a year ago), examined the situation in Temple some days ago, and the outcome of their deliberations was to reconstruct the works. Messrs. R. B. and F. B. Fodley, of Dallas, Tex., can furnish information as to that which is proposed to be done.

MR. D. D. WOOD informs us that Mr. G. A. Nicoll, Receiver for the New Berne (N. C.) Lighting and Fuel Company, has set noon of the 23d inst. as the hour and date for the sale at auction of the franchises and property of every sort in the Company's ownership.

MR. W. H. Harrison, JR., Biloxi, Miss., the holder of a franchise for the construction and operation of a gas plant in Anderson, S. C., says that the work of building the same will be undertaken this winter.

MR. V. R. ELLIS, writing from St. Louis, Mo., under date of October 26th, forwards the following: "The people of Kirkwood, Mo., are having trouble in securing a gas supply at what they are pleased to call a reasonable price. Early in September the City Council appointed a committee to try to secure gas at less than $1.20 per 1,000 cubic feet, and about three weeks ago the committee reported that the St. Louis County Gas Company's offer of $1.20 was the lowest bid. The Council has received an offer from the Union Finance Company, of Kansas City, Kas., to furnish natural gas at 50 cents per 1,000 cubic feet, if it can obtain a franchise to pipe gas to Kirkwood, and if it cannot get the franchise it offers artificial gas at $1 per 1,000. The offer was taken under advisement and referred to a committee, of which Wyatt Shallcross is Chairman."

"DARIEN, Conn., wants a gas supply, and the seeming obstacle thereto is the objection of the Stamford Gas and Electric Company, the proprietors of which Company also control the franchise for Darien's gas supply. The latter will sell these rights, but the Darien authorities seemingly think that in due time they can work out a plan whereunder the Stamford rights may be shunted. Mr. Branda, when called on in connection with the proposition, estimated that a plant up to the needs of Darien would cost between $70,000 and $80,000, and that its operation (including the keeping of 350 street lights) for the twelvemonth would not exceed $10,000. He was certain that enough private business could be secured to more than maintain the plant from becoming a a public debt maker in any sense. It is likely the matter will be adjusted so that next spring a gas supply for Darien will be a certainty, and that that supply will come from Stamford, as it should."—CONNECTICUT."

THE first regular meeting, of the fall season of the year, by the Illuminating Engineering Society, was held in the building of the Engineering Societies, N. Y., the evening of the 15th ult. A committee, consisting of Messrs. Macbeth, A. H. Elliott and E. F. Tweedy, presented a report which was virtually a summary of matters of import connected with the recent convention of the Society. Announcements were made of papers to be read at future meetings as follows: November meeting to be held at St. Gabriel's Branch Library, at which session the lighting of the building is to be considered and discussed. December meeting, paper by Dr. C. P. Steinmetz, the title of which is to be announced later. January meeting, "Street Lighting," by Mr. Walter E. Allen, District of Columbia, and S. G. Rhodes, of New York.

THE proprietors of the Consumers Gas Company, of Toronto, Ont., have announced their intention to sell at public auction 5,000 shares of new stock. The sale is set for January 19th, 1909.

WRITE to the advertising department of the Bristol Company, Waterbury, Conn., for copies of its Bulletins, Nos. 91, 92 and 93. No. 91 contains a brief summary of the temperature measuring instruments which the Bristol Company is manufacturing in its well equipped shops.

WOULD not this make you gasp? It is culled from the October issue of the booklet, "Gasps," which makes its appearance every month in-and-out of the offices of the Suburban Gas Company, of Chester, Pa.:

Mary had a little lamp,
'T was filled with kerosene;
She went one morn to light the fire,
She has not since benzine.

MESSRS. STONE & WEBSTER announce that dividend No. 55, of $3 per share, on the stock of the Fall River (Mass.) Gas Works Company, is payable to-day.

THE last report of Henry J. Blakeslee, Superintendent of the Syracuse (N. Y.) Bureau of Gas and Electricity, is noteworthy for two things—it covers the operations of his department for the month of September: First, the number of public lamps "out" for, at least 1 hour, showed a percentage of 2-tenths of 1 per cent. The possible or entire number of hours for a complete service should have been 438,000; the "outs" were in hour-numbers just 277; second, the number of meters tested footed 320. Of these, 231 registered correctly; 28 were fast; 45 were *slow*, and 16 were condemned. The candle power was: High, 21.8; low, 19.6; both of which are well above the legal requirements.

"GRANGER," writing from Seattle, Wash., under date of October 25th, sends the following: "According to Corporation Counsel Hamblen, the city of Spokane, Wash., has $5,000 in a special fund which may be placed in the general fund of the city and used for current expenses. In January, 1906, Wm. T. Kyle and associates were given a gas franchise by the City Council, and they deposited $5,000 with the City Treasurer as a guarantee that the work would be done. According to the franchise, the $5,000 was forfeited 18 months after the ordinance was granted, because of the facts that the gas plant had not been constructed nor had 10 miles of pipe been laid in the city. The Company, which was known as the Peoples Gas Company, in which Messrs. Henry Lamb and G. E. Armstrong were interested, brought suit against the city to recover the $5,000, but as the complaint contained no reason why the money should be returned the city demurred to the complaint, and since then no legal action has been taken by the Company in regard to the matter. That was several months ago. The $5,000 has been kept in a special fund by itself during the proceedings, but Mr. Hamblen is of the opinion that the city has the right to use the money. The sum will probably remain in the special fund where it is now until the City Treasurer is given notice to place the money in the general fund. The Peoples Gas Company projectors, in applying for the franchise, submitted that they would pay to the city 2 per cent. per annum of its gross receipts, and that at the end of 10 years it might condemn the works for purchase for operation on public account."

THE City Gas Company, of Norfolk, Va., this year has a rather unusually smart bowling team—at least so the members thereof aver—in fact, so sure of it are they that they will entertain challenges on bowling account with the team of any other gas company.

THE Knoxville (Tenn.) Gas Company's payment on royalty account to the city treasury, for the year ended September 30th last, was $3,489—this is at the rate of 3 per cent. on its gross receipts, and is in excess of the payment made the previous year by something like $250.

THERE seem many sorts of winds in Lincoln, Neb., all of which are of the dangerous sort. On the 19th ult. a very severe electrical storm swept over the city, and the gales that accompanied did much damage to property of the Lincoln Gas and Electric Light Company.

THE AMERICAN GAS LIGHT JOURNAL

## The Market for Gas Securities.

There is little to write concerning the market during the past week, and the net change is but half a point or so down from the previous closing figure. The opening to-day (Friday) was made at 144½ to 144¾. The market for bonds keeps steady to strong.

Brooklyn Union shows no change, and Peoples, of Chicago, is also in the steady list. The dullness over the trading in general is undoubtedly due to the election period, and it may be taken for granted that the next fortnight will show far greater activity than has prevailed for the last quarter. Washington (D. C.) gas is 324, bid.

## Gas Stocks.

**Quotations by George W. Close, Broker and Dealer in Gas Stocks.**

16 WALL STREET, NEW YORK CITY.

NOVEMBER 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

| *N. Y. City Companies.* | *Capital* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated Gas Co. | $73,177,000 | 100 | 144⅛ | 144¾ |
| Central Union Gas Co.— 1st 5's, due 1972, J. & J. | 3,000,000 | 1,000 | 98 | 101 |
| Equitable Gas Light Co.— Con. 5's, due 1932, M. & S. | 1,000,000 | 1,000 | — | 105 |
| Mutual Gas Co. | 3,500,000 | 100 | 130 | 160 |
| New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J. | 11,000,000 | 1,000 | 100 | 102 |
| New York & Richmond Gas Co. (Staten Island) | 1,500,000 | 100 | 37 | 43 |
| 1st Mtg. Gold Bds. 5 p. ct. | 1,000,000 | — | 98 | 104 |
| New York and East River— 1st 5's, due 1944, J. & J. | 3,500,000 | 1,000 | 100 | 105 |
| Con. 5's, due 1945, J. & J. | 1,500,000 | — | 97 | 101 |
| Northern Union— 1st 5's, due 1927, J. & J. | 1,250,000 | 1,000 | 86 | 91 |
| Standard | 5,000,000 | 100 | 70 | 100 |
| Preferred | 5,000,000 | 100 | 100 | 125 |
| 1st Mtg. 5's, due 1930, M. & N. | 1,500,000 | 1,000 | 100 | 105 |
| The Brooklyn Union | 15,000,000 | 1,000 | 137 | 142 |
| 1st Con. 5's, due 1948, M. & N. | 15,000,000 | — | 91⅛ | 92 |
| Yonkers | 200,650 | 500 | 130 | — |
| *Out-of-Town Companies.* | | | | |
| Bay State | 50,000,000 | 50 | 2¼ | 2¾ |
| " Income Bonds | 2,000,000 | 1,000 | — | 75 |
| Binghampton Gas Works | 450,000 | 100 | — | 65 |
| " 1st Mtg. 5's | 500,000 | 1,000 | 95 | 100 |
| Boston United Gas Co.— 1st Series S. F. Trust | 7,000,000 | 1,000 | 82 | 85 |
| 2d " " " | 3,000,000 | 1,000 | 47½ | 50 |
| Buffalo City Gas Co. | 5,500,000 | 100 | 5 | 8 |
| " " Bonds, 5's | 5,250,000 | 1,000 | 63 | 66 |
| Capital, Sacramento | 500,000 | 50 | — | 35 |
| Bonds (6's) | 150,000 | 1,000 | — | — |
| Chicago Gas Co. Guaranteed Gold Bonds | 7,000,000 | 1,000 | 104 | 106¼ |
| Cincinnati Gas and Electric Co. | 29,500,000 | 100 | 90 | 90¼ |
| Columbus (O.) Gas Co., 1st Mortgage Bonds | 1,500,000 | 1,000 | 92 | 98 |
| Columbus (O.) Gas Lt. & Heating Co. | 1,682,750 | 100 | 90¼ | 91 |
| Preferred | 3,026,500 | 100 | 71 | 80 |
| Consumers, Toronto | 2,000,000 | 50 | 200 | 204 |
| Consolidated, Baltimore | 11,000,000 | 100 | — | 105 |
| Mortgages, 6's | 3,600,000 | — | — | 118 |
| Chesapeake, 1st 6's | 1,000,000 | — | — | — |
| Equitable, 1st 6's | 910,000 | — | — | — |
| Consolidated, 1st 5's | 1,490,000 | — | — | 112 |
| Consolidated Gas Co. of N. J. | 1,000,000 | 100 | 15 | 17 |
| Con. Mtg. 5's | 880,000 | 1,000 | 92 | 95 |
| Bonds | 75,000 | — | — | 100 |
| Denver Gas and Electric | — | — | 74¼ | 75 |
| Detroit City Gas Co | 5,000,000 | 50 | — | 50 |
| " Prior Lien 5's | 4,619,000 | 1,000 | 97 | 100¼ |
| Detroit Gas Co., 5's | 381,000 | 1,000 | 75 | 80 |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | — | 101 |
| Essex and Hudson Gas Co. | 6,500,000 | — | 39 | 40 |
| Fort Wayne | 2,000,000 | — | — | — |
| " Bonds | 2,000,000 | — | 55 | — |
| Grand Rapids Gas Light Co., 1st Mtg. 5's | 1,225,000 | 1,000 | 104½ | 105 |
| Hartford | 750,000 | 25 | 190 | 200 |
| Hudson County Gas Co., of New Jersey | 10,500,000 | — | 112 | 11⅓ |
| " Bonds, 5's | 10,500,000 | — | 103 | 103½ |
| Indianapolis | 2,000,000 | — | 60 | 70 |
| " Bonds, 5's | 2,650,000 | — | 104½ | 105 |
| Jackson Gas Co. | 250,000 | 50 | 82 | — |
| " 1st Mtg. 5's | 200,000 | 1,000 | 97 | 100 |
| Kansas City Gas Light Co., of Missouri | 5,000,000 | 100 | — | 36 |
| Bonds, 1st 5's | 3,822,000 | 1,000 | 102 | 104 |
| Laclede Gas Co., St. Louis. | 10,000,000 | 100 | — | 100 |
| Preferred | 2,500,000 | 100 | 60 | 90 |
| Bonds | 10,000,000 | 1,000 | 104 | 104¼ |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | — | 60 |
| Bonds | 1,000,000 | 1,000 | 60 | 65 |
| Louisville | 2,570,000 | 50 | 143 | 145 |
| Madison Gas and Electric Co. | | | | |
| " 1st Mtg. 6's | 350,000 | 1,000 | 106 | 106¾ |
| " 6 per cent. scrip, due 1910 | 100,000 | 25 | 60 | 60½ |
| Massachusetts Gas Companies, of Boston | 25,000,000 | 100 | 56 | 5⅞¼ |
| Preferred | 25,000,000 | 100 | 88 | 88¼ |
| Montreal Gas Co., Canada | 2,000,000 | 100 | 218 | 218¾ |
| Nashville Gas Light Co. | 1,000,000 | 100 | 110 | — |
| Newark, N. J., Con. Gas Co. | 6,000,000 | — | 56 | 58 |
| Bonds, 6's | 6,000,000 | — | 137 | 138 |
| New Haven Gas Co. | 2,000,000 | 25 | 200 | — |
| Peoples Gas Lt. & Coke Co., Chicago | 25,000,000 | 100 | 96 | 96⅛ |
| 1st Mortgage | 20,100,000 | 1,000 | — | — |
| 2d " | 2,500,000 | 1,000 | 104 | — |
| Rochester Gas & Electric Co. | 2,150,000 | 50 | 88 | — |
| Preferred | 2,150,000 | 50 | 118 | — |
| Consolidated 5's | 2,000,000 | — | 104⅛ | 103⅛ |
| San Francisco Gas Co., Cal. | 15,500,000 | — | — | — |
| St. Joseph Gas Co.— 1st Mtg. 5's | 751,000 | 1,000 | 92 | — |
| St. Paul Gas Light Co. | 1,500,000 | 100 | 45 | 47 |
| 1st Mortgages, 6's | 620,000 | 1,000 | 113 | 116 |
| Extension, 6's | 600,000 | 1,000 | 112½ | 115 |
| General Mortgage, 5's | 2,465,000 | 1,000 | 96¼ | — |
| Syracuse Gas Co., N. Y. | 1,975,000 | 100 | 50 | 55 |
| Bonds | 2,047,000 | 1,000 | 102 | — |
| Washington (D. C.) Gas Co. | 2,600,000 | 20 | 323½ | 327½ |
| 1st Mortgage, 6's | 600,000 | — | — | — |
| Western Gas Co., Milwaukee | 4,000,000 | — | — | — |
| Wilmington (Del.) Gas Co. | 600,000 | 50 | 230 | — |

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| Kerr Murray Mfg. Co., Fort Wayne, Ind. | 785 |
| Logan Iron Works, Brooklyn, N. Y. | 788 |
| R. D. Wood & Co., Philadelphia, Pa. | 786 |
| Riter-Conley Mfg. Co., Pittsburgh, Pa. | 771 |
| Stacey Mfg. Co., Cincinnati, O. | 787 |
| The Gas Machinery Co., Cleveland, O. | 768 |
| Western Gas Construction Co., Fort Wayne, Ind. | 748 |

**PRODUCER POWER PLANTS.**

| | |
|---|---|
| Economical Gas Apparatus Construc. Co., Toronto, Ont. | 783 |
| R. D. Wood & Co., Philadelphia, Pa. | 786 |

**TAR AND CARBONIC ACID EXTRACTOR.**

| | |
|---|---|
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| Economical Gas Apparatus Construc. Co., Toronto, Ont. | 783 |
| Isbell-Porter Co., Newark, N. J. | 772 |
| Kerr Murray Mfg. Co., Fort Wayne, Ind. | 785 |
| Stacey Mfg. Co., Cincinnati, O. | 787 |
| The Gas Machinery Co., Cleveland, O. | 768 |
| Western Gas Construction Co., Fort Wayne, Ind. | 748 |

**AMMONIA CONCENTRATORS.**

| | |
|---|---|
| Bartlett, Hayward & Co., Baltimore, Md. | 785 |
| Michigan Ammonia Works, Detroit, Mich. | 765 |
| The Gas Machinery Co., Cleveland, O. | 768 |
| Western Gas Construction Co., Fort Wayne, Ind. | 748 |

**GAS METERS.**

| | |
|---|---|
| American Meter Co., New York and Philadelphia. | 791 |
| D. McDonald & Co., Albany, N. Y. | 789 |
| Helme & McIlhenny, Philadelphia, Pa. | 791 |
| John J. Griffin & Co., Philadelphia, Pa. | 792 |
| Keystone Meter Co., Royersford, Pa. | 790 |
| Maryland Meter and Mfg. Co., Baltimore, Md. | 790 |
| Metric Metal Co., Erie, Pa. | 791 |
| Nathaniel Tufts Meter Co., Boston, Mass. | 790 |
| New York Improved Meter Co., New York City. | 790 |
| Pittsburg Meter Co., East Pittsburg, Pa. | 774 |
| Rotary Meter Co., New York City. | 767 |
| Sprague Meter Co., Bridgeport, Conn. | 789 |
| United States Meter Co, Brooklyn, N. Y. | 791 |

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| Keystone Meter Co., Royersford, Pa. | 790 |
| Nathaniel Tufts Meter Co., Boston, Mass. | 790 |
| New York Improved Meter Co., New York City. | 789 |
| Pittsburg Meter Co., East Pittsburg, Pa. | 774 |
| Sprague Meter Co., Bridgeport, Conn. | 789 |

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| | |
|---|---|
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**WATER METERS.**

| | |
|---|---|
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**GAS AND WATER PIPES.**

| | |
|---|---|
| Davis & Farnum Mfg. Co., Waltham, Mass. | 784 |
| Donaldson Iron Co., Emaus, Pa. | 776 |
| Economical Gas Apparatus Construc. Co., Toronto, Ont. | 783 |
| R. D. Wood & Co., Philadelphia, Pa. | 786 |

**GAS COALS.**

| | |
|---|---|
| Berwind-White Coal Mining Co., New York and Phila. | 782 |
| Perkins Co., New York City. | 782 |
| Westmoreland Gas Coal Co., Philadelphia, Pa. | 783 |

**GAS MAIN STOPPERS.**

| | |
|---|---|
| Edward A. Behringer, New York City. | 786 |
| Safety Gas Main Stopper Co., New York City. | 781 |

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| | |
|---|---|
| Sullivan Bros., Flushing, N. Y. | 783 |

**GAS TAPPING MACHINES.**

| | |
|---|---|
| George Light, Dayton, O. | 783 |
| H. Mueller Manufacturing Co. Decatur, Ills. | 774 |

**CANNEL COALS.**

| | |
|---|---|
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**STOKING MACHINERY.**

| | |
|---|---|
| G. A. Bronder, New York City. | 781 |

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|---|---|
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| Brown Hoisting Machinery Co., Cleveland, O. | 776 |
| Cruse-Kemper Co., Philadelphia, Pa. | 772 |
| C. W. Hunt Company, New York City. | 784 |
| Economical Gas Apparatus Construc. Co., Toronto, Ont. | 783 |
| G. A. Bronder, New York City. | 781 |
| Kerr Murray Mfg. Co., Fort Wayne, Ind. | 785 |
| The Gas Machinery Co., Cleveland, O. | 768 |
| Western Gas Construction Co., Fort Wayne, Ind. | 748 |

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Kerr Murray Mfg. Co., Fort Wayne, Ind..... 785
Stacey Mfg. Co., Cincinnati, O..... 787

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Standard Oil Co., New York City..... 739

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C. M. Keller, Columbus, Ind..... 783

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Isbell-Porter Co., Newark, N. J..... 772
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Didier-March Co., New York City..... 769
Evens & Howard Firebrick Co., St. Louis, Mo..... 766
Gas Bench Construction Co., St. Louis, Mo..... 780
Henry Maurer & Son, New York City..... 773
Improved Equipment Company, New York City..... 770
James Gardner, Jr., Co., Bolivar, Pa..... 782
J. H. Gautier & Co., Jersey City, N. J..... 780
Laclede-Christy Clay Products Co., St. Louis, Mo..... 772
Missouri Firebrick Co., St. Louis, Mo..... 780
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.... 770

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Didier-March Co., New York City]..... 769
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Improved Equipment Company, New York City..... 770
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Laclede-Christy Clay Products Co., St. Louis, Mo..... 772
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Davis & Farnum Mfg. Co., Waltham, Mass..... 784
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General Gas Light Co., Kalamazoo, Mich..... 775
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Thos. T. W. Miner, New York City..... 768
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Economical Gas Apparatus Construc. Co., Toronto, Ont. 783
Isbell-Porter Co., Newark, N. J..... 772
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The Gas Machinery Co, Cleveland, O..... 768
The P. H. & F. M. Roots Co., Connersville, Ind..... 775
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Connersville Blower Company, Connersville, Ind..... 770
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Kerr Murray Mfg. Co., Fort Wayne, Ind..... 785
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Deily & Fowler Mfg. Co., Philadelphia, Pa..... 788
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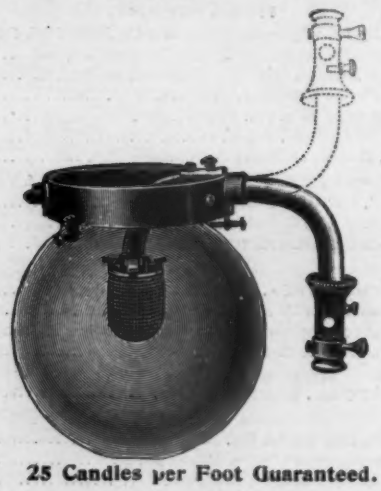

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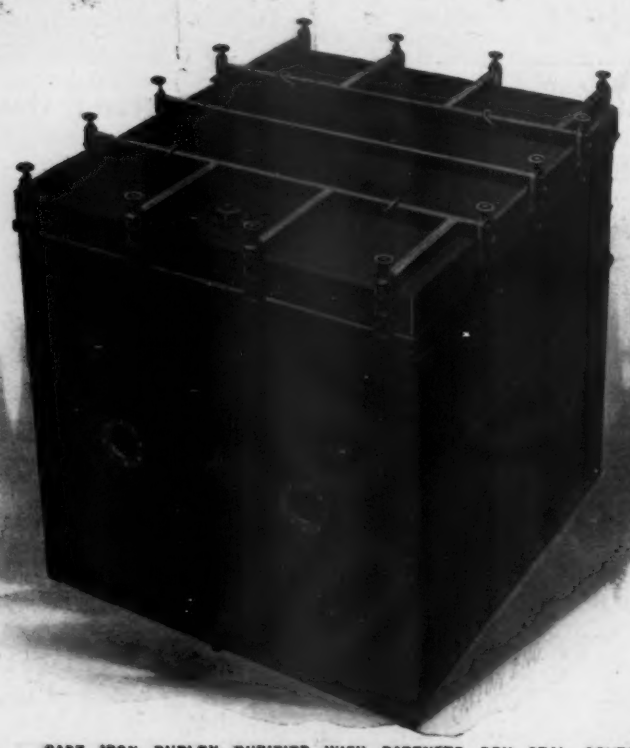

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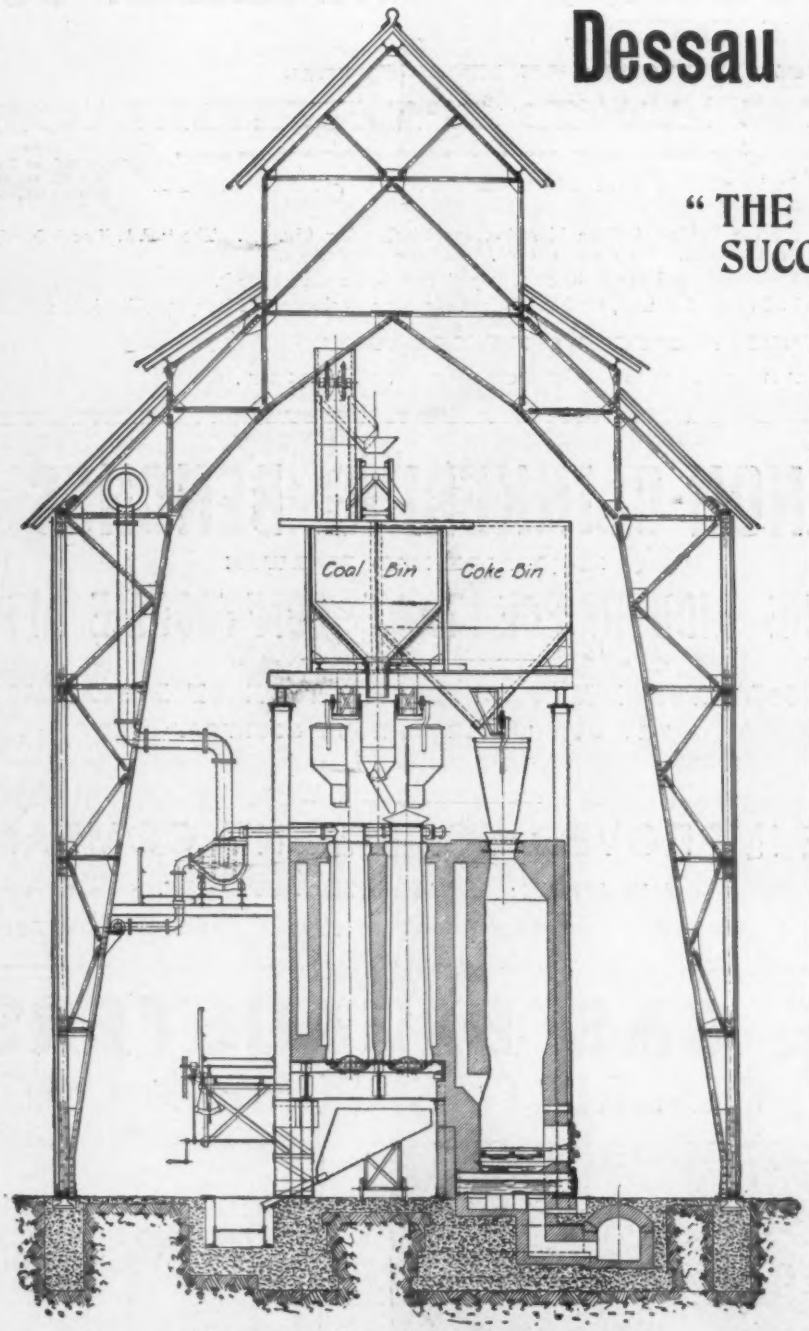


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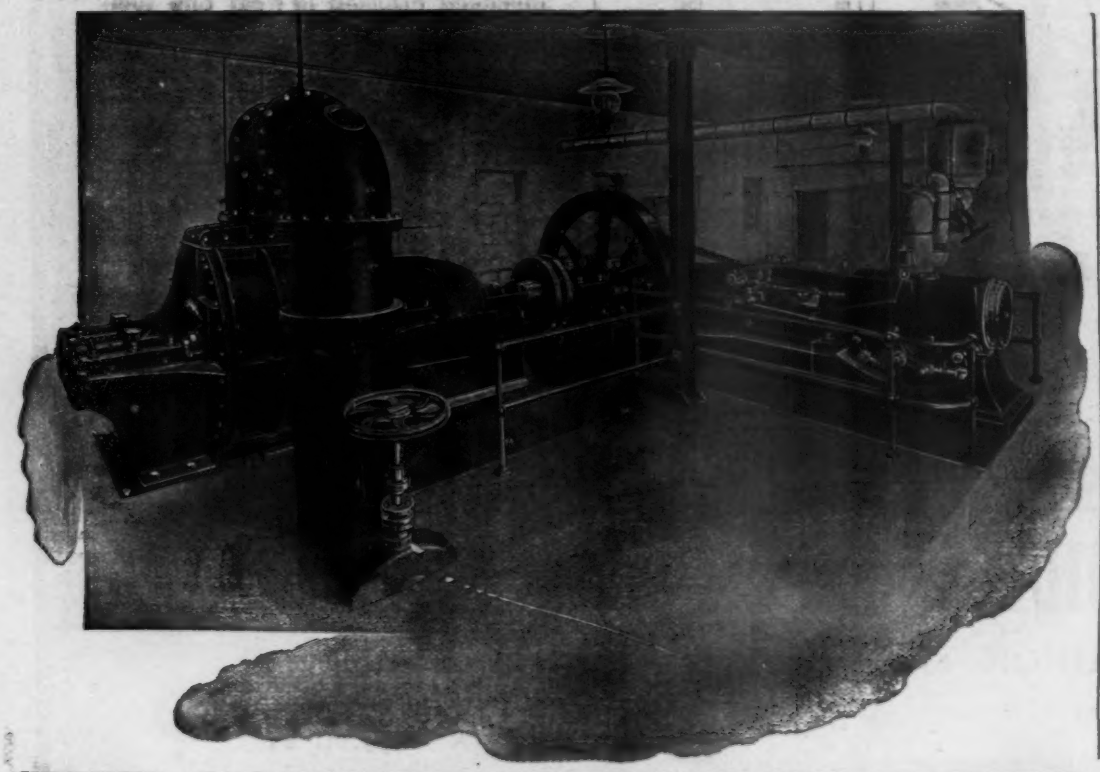

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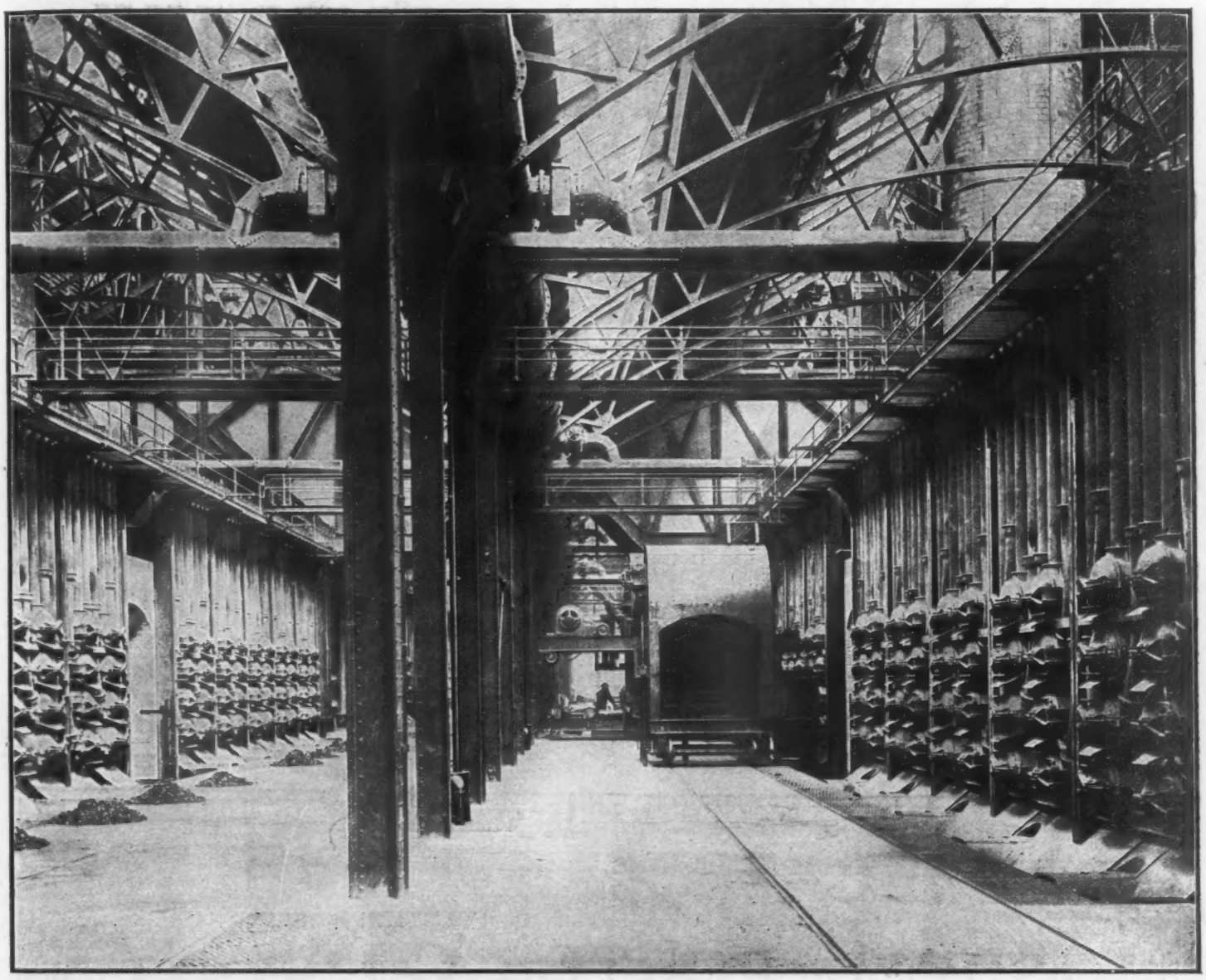

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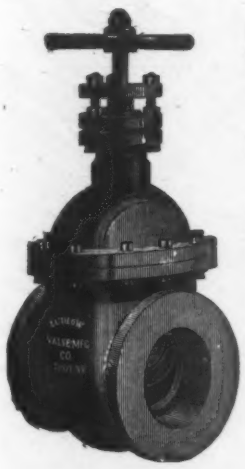

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**POSITIVE GAS EXHAUSTERS AND BLOWERS,**

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Most Simple and Efficient Machine on the Market. Let us figure on YOUR requirements.

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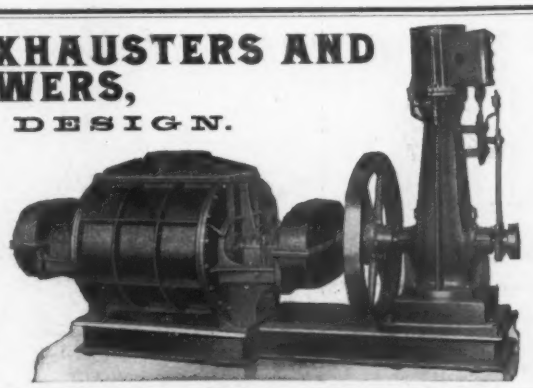

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**GAS BENCHES.**

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BEST DESIGN,
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By GEORGE LUNGE, PH.D. Third and Enlarged Edition.
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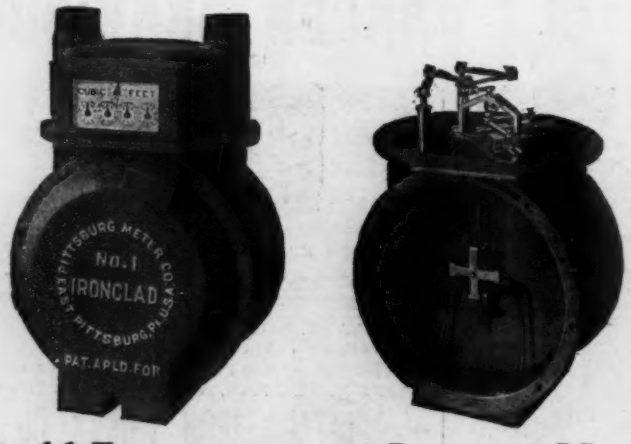


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## Dry Gas Meters

Measure with equal accuracy both large and small volumes of either natural or artificial gas.

Valve seats in one piece attached to main case, assuring permanent alignment with slide valves.

Adjusted for accuracy by State Gas Inspector and tested for high pressure. Easily connected to service pipe. All parts interchangeable.

Ask for Catalogue G-I.

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DETROIT – MICHIGAN

BEST IN THE WORLD.

## Humphrey Instantaneous Bath Water Heaters

Should be used in every home. They make Hot Water **always** ready. Require no attention after installation. Hot water pours forth at any time upon lighting the gas. Close off the gas and all expense ceases. **Absolutely Guaranteed.**

**Special Merits.**

A burner that won't light back; a **rust proof** enameled shelf; a removable base plate for ready access to burner.

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## No Other Line Like It.

**Mueller Gas Tapping Machines embrace eight patterns--one for every phase of work, from the least to the most exacting. It is the most complete and largest line made, and every machine has demonstrated in actual test its ability to measure up to every claim we make for it.**

**Each machine is UNCONDITIONALLY GUARANTEED.**

The No. 11, 12 and 13 machines are for dry tapping; the No. 14 for dry tapping or tapping under pressure; the No. 15, 16, 17 and 18 for tapping under pressure.

**Full description and prices upon application.**

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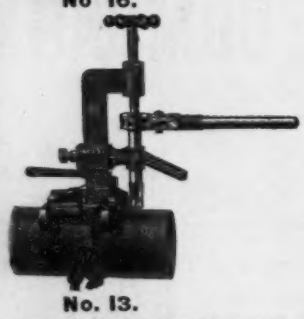
No 16.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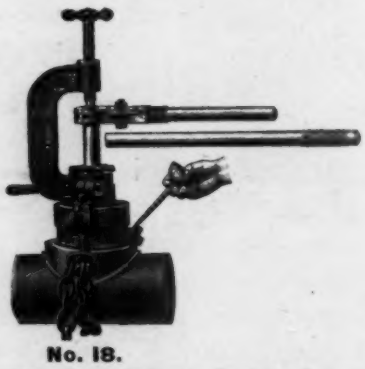
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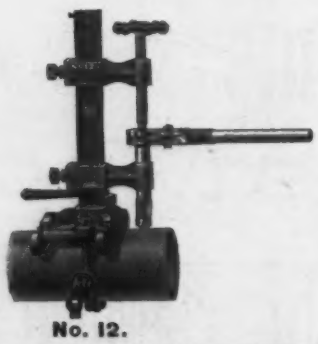
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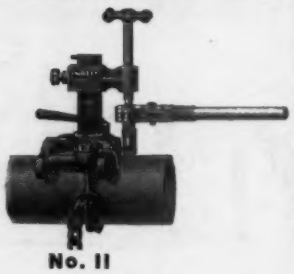
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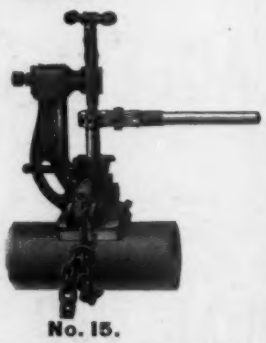
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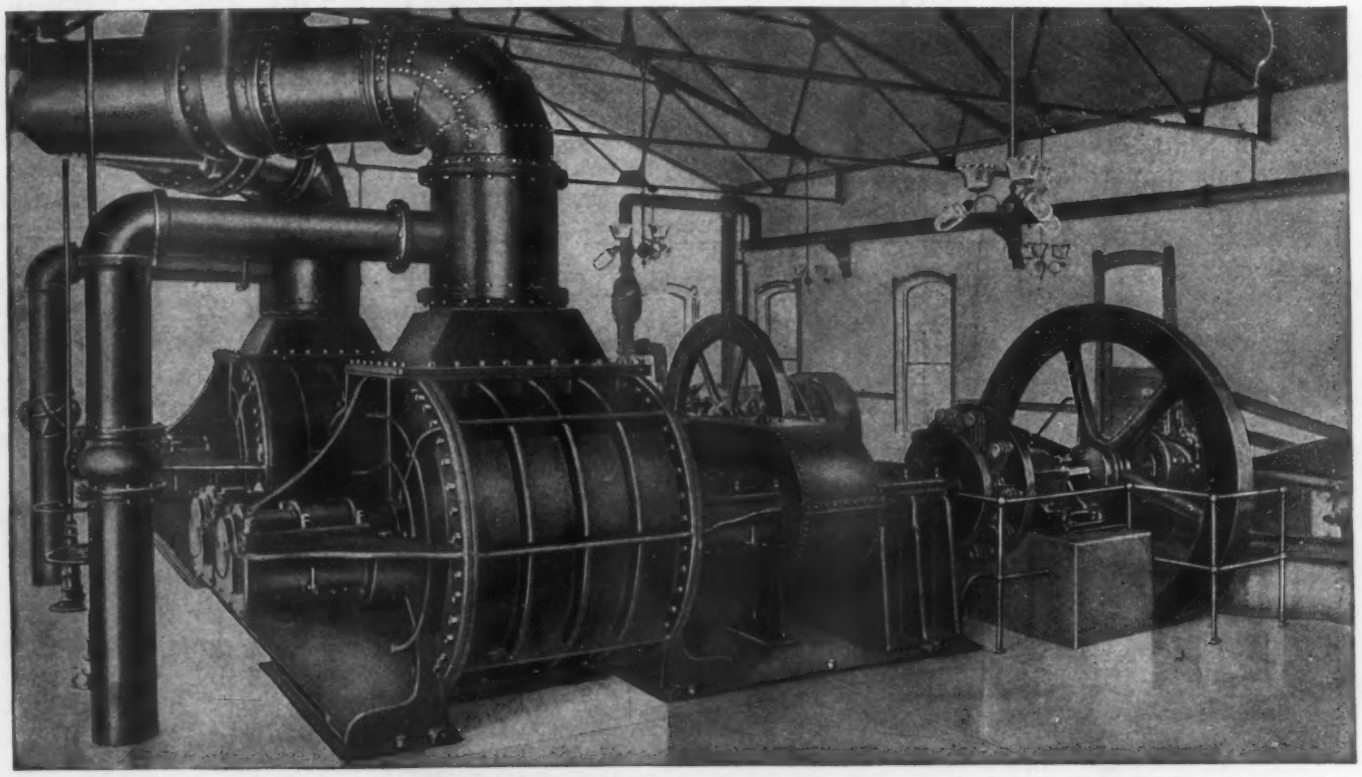
An installation of two units, each handling 800,000 cubic feet per hour, under 5 pounds per square inch, installed for the Peoples Gas Light and Coke Company, Chicago, Ills.



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## Metal or Porcelain Enamel Finishes.

First shipments will be in small lots to enable all Gas Companies to obtain samples for test. * * * * * * *

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THE WM. H. BRISTOL ELECTRIC PYROMETERS
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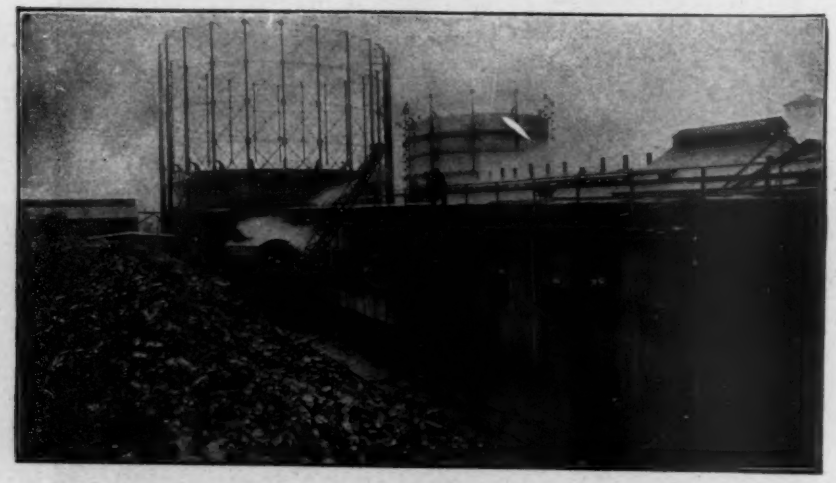

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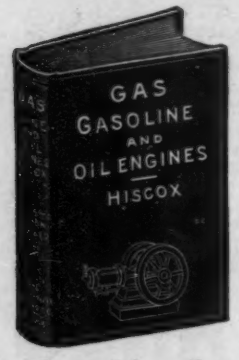


**Gas, Gasoline and Oil Engines,**

INCLUDING GAS PRODUCER PLANTS,

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**NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,**

## Photometrical and Experimental Apparatus.


## PUBLIC LIGHTING TABLE.

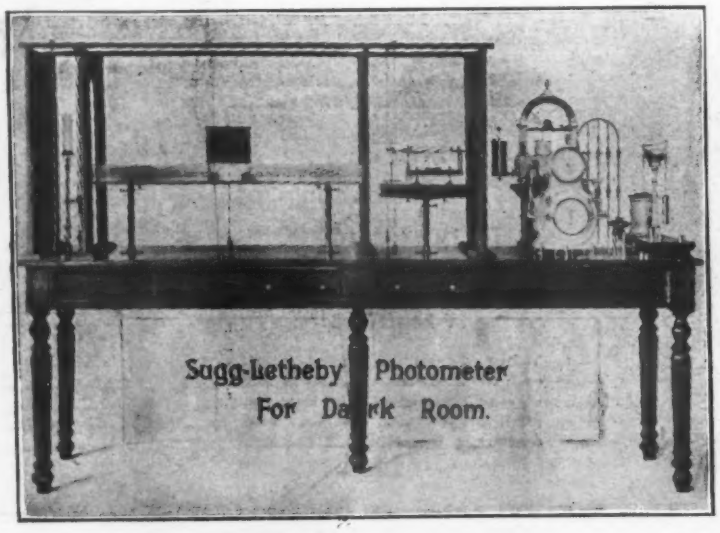
**NOVEMBER, 1908.**

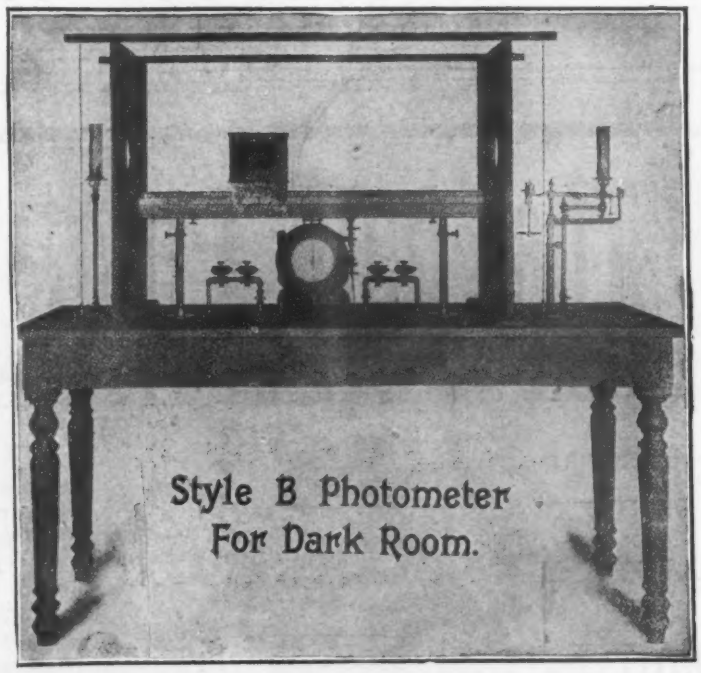
| Day of Week. | Date. | Table No. 1. FOLLOWING THE MOON. Light. | Extinguish. |
|---|---|---|---|
| Sun. | 1 | 10.30 PM FQ | 5.30 AM |
| Mon. | 2 | 11.40 | 5.30 |
| Tue. | 3 | 12.50AM | 5.30 |
| Wed. | 4 | 2.10 | 5.30 |
| Thu. | 5 | 3.20 | 5.30 |
| Fri. | 6 | No L. | No L. |
| Sat. | 7 | No L. FM | No L. |
| Sun. | 8 | No L. | No L. |
| Mon. | 9 | 5.20PM | 7.00PM |
| Tue. | 10 | 5.20 | 7.40 |
| Wed. | 11 | 5.20 | 8.30 |
| Thu. | 12 | 5.20 | 9.20 |
| Fri. | 13 | 5.20 | 10.20 |
| Sat. | 14 | 5.20 | 11.20 |
| Sun. | 15 | 5.10LQ | 12.20AM |
| Mon. | 16 | 5.10 | 1.10 |
| Tue. | 17 | 5.10 | 2.10 |
| Wed. | 18 | 5.10 | 3.10 |
| Thu. | 19 | 5.10 | 4.10 |
| Fri. | 20 | 5.10 | 5.50 |
| Sat. | 21 | 5.10 | 5.50 |
| Sun. | 22 | 5.10 | 6.00 |
| Mon. | 23 | 5.10NM | 6.00 |
| Tue. | 24 | 5.10 | 6.00 |
| Wed. | 25 | 5.10 | 6.00 |
| Thu. | 26 | 5.10 | 6.00 |
| Fri. | 27 | 5.10 | 6.00 |
| Sat. | 28 | 8.20 | 6.00 |
| Sun. | 29 | 9.30 | 6.00 |
| Mon. | 30 | 10.40FQ | 6.00 |

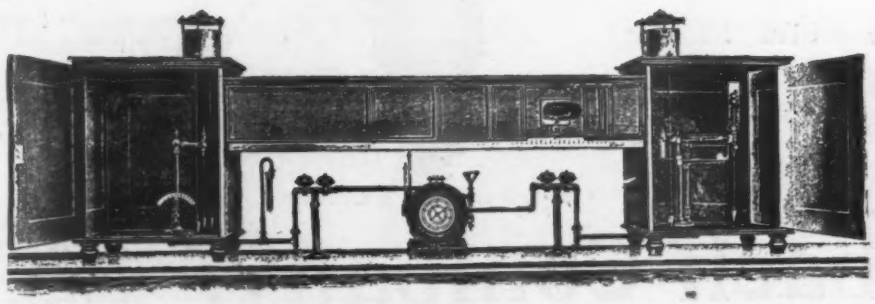
### TOTAL HOURS DURING 1908.

**By Table No. 1.**

| | Hrs.Min. |
|---|---|
| January | 228.30 |
| February | 187.30 |
| March | 192.00 |
| April | 160.10 |
| May | 155.10 |
| June | 138.00 |
| July | 155.50 |
| August | 173.40 |
| September | 185.20 |
| October | 214.00 |
| November | 218.10 |
| December | 226.40 |
| Total, yr. | 2235.00 |



Closed Photometer For Light Room.

**CIRCULARS SENT ON REQUEST.**

## PUBLIC LIGHTING TABLE.

**NOVEMBER, 1908.**

| Day of Week. | Date. | Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Complete Lighting in One Hour From Time Given P. M. | Complete Extinguishing in 50 Minutes From Time Given A.M. |
|---|---|---|---|
| Sun. | 1 | 4.37 | 5.17 |
| Mon. | 2 | 4.37 | 5.17 |
| Tue. | 3 | 4.37 | 5.17 |
| Wed. | 4 | 4.37 | 5.17 |
| Thu. | 5 | 4.27 | 5.27 |
| Fri. | 6 | 4.27 | 5.27 |
| Sat. | 7 | 4.27 | 5.27 |
| Sun. | 8 | 4.27 | 5.27 |
| Mon. | 9 | 4.27 | 5.27 |
| Tue. | 10 | 4.27 | 5.27 |
| Wed. | 11 | 4.27 | 5.27 |
| Thu. | 12 | 4.17 | 5.32 |
| Fri. | 13 | 4.17 | 5.32 |
| Sat. | 14 | 4.17 | 5.32 |
| Sun. | 15 | 4.17 | 5.32 |
| Mon. | 16 | 4.17 | 5.32 |
| Tue. | 17 | 4.17 | 5.32 |
| Wed. | 18 | 4.17 | 5.32 |
| Thu. | 19 | 4.12 | 5.42 |
| Fri. | 20 | 4.12 | 5.42 |
| Sat. | 21 | 4.12 | 5.42 |
| Sun. | 22 | 4.12 | 5.42 |
| Mon. | 23 | 4.12 | 5.42 |
| Tue. | 24 | 4.12 | 5.42 |
| Wed. | 25 | 4.12 | 5.42 |
| Thu. | 26 | 4.07 | 5.52 |
| Fri. | 27 | 4.07 | 5.52 |
| Sat. | 28 | 4.07 | 5.52 |
| Sun. | 29 | 4.07 | 5.52 |
| Mon. | 30 | 4.07 | 5.52 |

### TOTAL HOURS DURING 1908.

| | Hrs.Min. |
|---|---|
| January | 481.50 |
| February | 329.15 |
| March | 351.50 |
| April | 341.50 |
| May | 233.05 |
| June | 218.10 |
| July | 282.55 |
| August | 254.55 |
| September | 292.25 |
| October | 420.45 |
| November | 374.30 |
| December | 411.05 |
| | 3992.35 |
| Deduct on account of 50 min. extinguishing time | 30.30 |
| Total, yr. | 3962.05 |

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

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....OF AMERICA....

No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

# The Chic Light.

ONE OF THE MOST POPULAR AND BEST SELLERS OF THE WELSBACH LINE.

For decorative appearance and large volume of light at a popular price to the consumer,

THE CHIC LIGHT

is practically alone in the field. Complete satisfaction to the user is its strong point.

THE CHIC LIGHT—Design No. 71310.

PRICES:

Boxed complete, with No. 71 Welsbach burner, No 310 F. Q. M. cylinder, No. 196 Junior J Brand Welsbach mantle, including the No. 316 opal shade, which will be packed separately.

Price, complete, clear cylinder, each, dozen lots, . . . . . $1.35
Price, complete, clear cylinder, 100 lots, each, . . . . . 1.25

When supplied with **No. 310 F. Q. M. Opal Cylinder** add 10 cents to above list.

Price of Shade No. 316.
Package Contains 16 Dozen.

Price, per dozen, . . . . . $4.40
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LESSEES, OPERATORS AND BUILDERS OF **GAS WORKS.**

Largest Builders of CARBURETTED WATER GAS PLANT IN AMERICA.

**SOLE AMERICAN BUILDERS**

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## Standard Double-Superheater Lowe Water Gas Apparatus.

## 1907 CONTRACTS.

**PARTIAL LIST OF PLACES:**

**Newburgh, N. Y.**
**Helena, Mont.**
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**Suffolk, Va.**
**Winsted, Conn.** (2d contract).
**Nashua, N. H.**
**Augusta, Me.** (2d contract).
**Everett, Mass.**
**Jenkintown, Pa.** (2d contract).
**Coney Island, N. Y.**
**Mexico, Mo.**
**Jacksonville, Fla.**
**Syracuse, N. Y.** (2d contract).
**Atlanta, Ga.** (2d contract).
**Holyoke, Mass.**
**Peoria, Ills.**
**Schenectady, N. Y.** (2d contract).
**Danbury, Conn.**
**Galveston, Tex.** (2d contract).
**Quebec, Canada.**
**Indianapolis, Ind.** (2d contract).
**Bessemer, Ala.**
**Waterbury, Conn.** (5th contract).
**Sioux Falls, S. D.** (3d contract).
**Philadelphia, Pa.**
**New Hartford, Conn.**
**Poughkeepsie, N.Y.** (2d contract).
**Nashville, Tenn.**
**Salisbury, Md.**
**Norfolk, Va.** (4th contract).
**Wallingford, Conn.**
**Richmond, Va.** (2d contract).
**Oak Bluffs, Mass.**
**Arlington, Mass.**

TOTAL SETS INSTALLED DURING YEAR, . . . . . 43
TOTAL SETS INSTALLED TO DECEMBER 31, 1907, . . . . . 677
TOTAL DAILY CAPACITY, TO DECEMBER 31, 1907, . . . . 545,865,000 cu. ft.

## Tar Extractors for Carburetted Water Gas.
## Photometrical Apparatus.
## Gas Analysis Apparatus.
## Recording Gauges.
## Straight Standpipe System for Coal Gas Retorts.
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How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

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HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

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We will guarantee "Better Benches," to be easier to control, make more gas per retort, and operate with less fuel than any bench on the market.

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JOHN DELL, President and General Manager.

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COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

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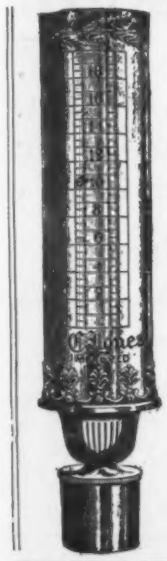

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Unison Telemetric Pressure Gauge,

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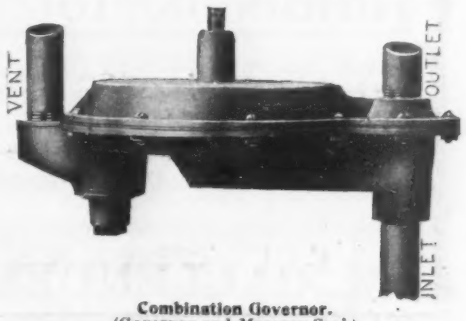


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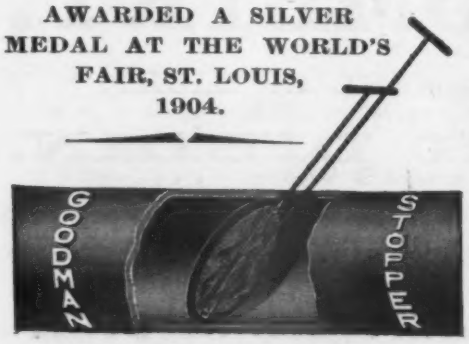


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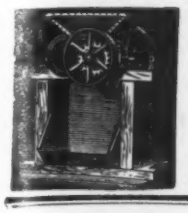

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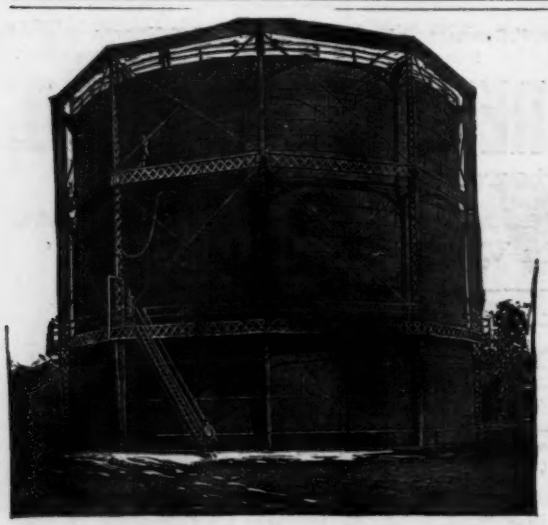

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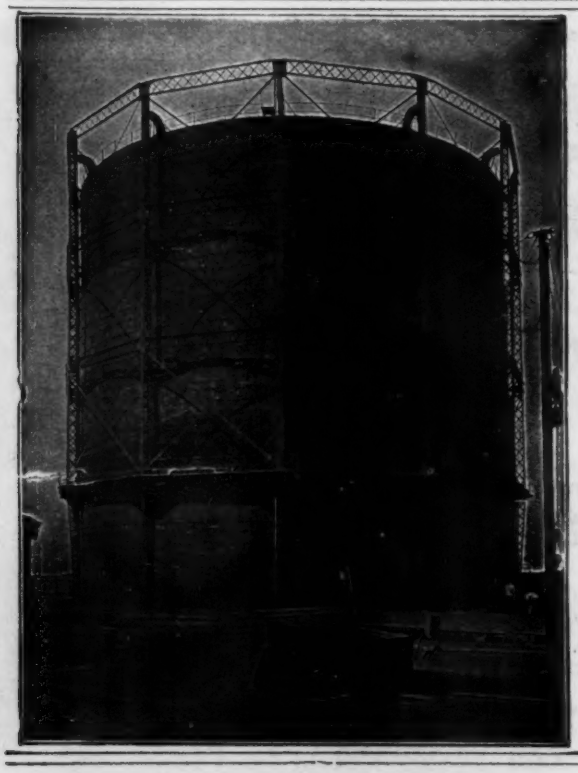

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